

THE IRON AGE

New York, March 7, 1929

ESTABLISHED 1855

VOL. 123, No. 10

Profits by Careful Budgeting

Production Schedules and Expenditures for Plant
Improvements Based on Frequent
Business Forecasts

BY M. P. SULLIVAN*

EXPERIENCE shows that the machine tool industry has never maintained anything approaching a steady flow of production, but instead has had either a feast or a famine. Since the demand for machine tools is so spasmodic, machine tool builders must use careful accounting methods to determine the proper size of their plants and must control inventories to avoid not only the hazards which every manufacturer faces, but also the tremendous risk of loss from obsolescence which invariably results from going out of a high sales peak into a low valley with large stocks on hand. In fact, the industry's experience has been that after each high sales peak there has followed a period of important changes in designs, resulting in large losses from obsolescence by manufacturers caught with big inventories.

When is the demand for machine tools at its peak? Is it not when all industry employing high grade mechanics and tool makers is also at its peak of production? Therefore, if the machine tool manufacturer goes into such a period unprepared, how is he going to take advantage of the situation?

Forecasting Rises and Falls in Demand Adds Profits, Checks Losses

The successful machine tool builder must look to his accountant for accurate information as to trends not only in demand, but also in every vital element in his business. The accountant must keep his finger on the pulse of the industries using his tools and must be able to predict

THE methods of business forecasting and control employed by the National Automatic Tool Co., Richmond, Ind., may be applied not alone to the machine tool industry, but to manufacturing generally. As the volume of orders is the yardstick by which business is commonly graded as poor, fair, good or excellent, this company uses orders in drawing its charts. It keeps a close check on costs, profits and losses through a monthly system of reports submitted to the management by the accounting department. The company has found that its methods enable it to take advantage of the high peaks when it sees them coming and to provide for the periods of poor business by reduction of inventories and other precautions, thereby protecting profits and cutting down on losses.

each rise and fall so that the management of his company can take full advantage of the high peak and keep down losses which are likely to occur in the off years.

Growth in the individual size of the machine tool users has created another problem for machine tool builders. Ten years ago many of the latter built only a standard line of tools, which could in part be carried in stock, whereas today there are few manufacturers whose production does not include special or single purpose tools. This means that the accountant must be able to estimate accurately and quickly the cost of special tools. One bad mistake can easily wipe out the profits of many months. I say "accurately and quickly," because the prospective buyer usually asks for a quotation when he is bringing out a new design of his product and possibly the most important factor to him is early delivery. Naturally, he places his business with the builder who can make the best deliveries. That

builder must be equipped to estimate his costs and figure his selling price often in a few hours, and to design, manufacture and deliver the finished tools within a comparatively short time.

Successful machine tool builders today are demanding of their accountants profit and loss statements at least once a month. These statements should be prepared not later than 10 days after the close of each accounting period. Sharp fluctuations in the demand for his product and the special nature of his business make it imperative that the machine tool builder watch his expenses and preferably budget them so that during the period of good business he will not permit profits to be dissipated by unnecessary expenses or by unjustifiable increases in

*Assistant treasurer, National Automatic Tool Co., Richmond, Ind., and vice-president, Indianapolis chapter, National Association of Cost Accountants.

MATERIAL RECORD

Material
Part No. _____

Pat. or Forge No.	Period	Maximum	Location
Feet or Lbs. per Unit	Order Quan.	Minimum	When Effective
Size	Order Point	Exception	Superseded by

MATERIAL ORDERED

Date	Order No.	From	Part's	Balance
------	-----------	------	--------	---------

OUTSIDE OPERATIONS

Date	Order No.	From	Part's	Balance
------	-----------	------	--------	---------

ROUGH STOCK

Date	Order No.	Part's	Balance
------	-----------	--------	---------

WORK IN PROCESS

Date	Order No.	Part's	Balance
------	-----------	--------	---------

FINISHED STOCK

Date	Order No.	Part's	Balance
------	-----------	--------	---------

AVAILABLE FINISHED STOCK

Date	Order No.	Part's	Balance
------	-----------	--------	---------

MATERIAL Record Card

Serves as a Perpetual Inventory. It shows every item carried in stock. The cost of every machine part is recorded on the comparative cost record card (inset)

COMPARATIVE COST RECORD

PART NAME _____

PART NO. _____

Date	Order No.	From	Qty.	Unit Cost	WEIGHT	
					Lbs.	Cost

costs, which reduce the funds needed to carry him through the dull and unprofitable periods.

From our standpoint, the calendar year as a fiscal accounting period is inadequate. Clerical and manufacturing staffs, as well as buildings and production equipment, must be carried through the lean years so that they are available in the years of plenty. Surely no one will dispute the fact that the cost of carrying excess capacity during lean years should be charged against the prosperous years, nevertheless I have yet to hear of a successful plan for doing so. Therefore, we necessarily must keep our books on a fiscal year basis.

The three problems more peculiar to the machine tool industry than to other lines are the great flexibility of demand and lack of flexibility of production and the necessity of controlling expenditures by careful budgeting, and by prompt and accurate accounting reports.

Logarithmic Chart of Orders Used As a Key to Forecasts

The National Automatic Tool Co. has attempted to solve these problems so far as they arise in its business. The condition that makes business good or poor with us is orders. We have therefore charted orders received since the inception of this business, using a logarithmic chart. This chart resulted in a line of many peaks and the same number of low valleys. The time distance from the top of one peak to the top of another varied considerably, but in general outline the logarithmic curves were similar. We therefore considered a period starting from one high peak and stopping at the next high peak as a cycle. Sometimes it has taken quite a few years to complete a cycle and at other times this cycle has been completed within a year.

We know that this business will continue to pass through such cycles. We wish to take advantage of the high peaks when we see them coming, and we have taken the information from which each of these cycles has been built and have averaged it and have made a composite cycle, which is nothing more nor less than a curved line something in the shape of a letter "U," which represents a complete cycle for our business. If it is possible for us to foretell in advance our position on that cycle, we are better equipped to take advantage of good business when it comes and to protect ourselves from losses due to poor business.

We chart information not only from within our plant, but also from sources all over the country. From these charts we attempt to tell in what part of our cycle we are and how long it will last. For instance, the part of the chart covering the time during which demand is trending upward might represent three months or three years. To determine the amount and character of our stock orders (which naturally means inventory control), we must know where we are in that cycle. This is difficult, of course, and is by no means perfect, but when we forecast inaccurately we suffer from either loss of business because of insufficient preparedness to care for it or from carrying an organization and inventory to meet business that fails to materialize.

In estimating prices to be quoted on special machines we fall back on past experience. We have accumulated records and costs of all machines the company has built from its inception, and since 1916 we have kept the cost of every individual part made in our plant or purchased outside. For accounting purposes we "break down" every finished machine into hours of shop time, hours of en-

gineering time, hours of pattern time, pounds of cast iron, pounds of steel, pounds of brass or bronze, and feet of pattern lumber. We also "break down" the machine into dollars and cents of materials used, of labor and of indirect factory expense.

By applying this information to an engineering estimate made by our estimating engineer, we can estimate accurately our factory cost on any special machine, and to this amount we add a percentage for administration and selling. After every factor relating to price is considered, the selling price is decided upon. Under no circumstances do we ever consider quoting a price which, according to our estimates, will not give us a profit. The percentage for administration and for selling varies; it is the result of a continuous intensive study of these expenses by which we attempt to arrive at the true cost.

"Material Record" Cards Show Every Item Carried in Stock

An inventory of every piece or assembled part carried in stock is entered on "material record" cards. The first column of the card is used to record the order and receipt of either castings or forgings bought from outside sources. If any operations are performed by an outside company other than the source from which the material is purchased, the information is entered in the second column. For instance, if we buy castings from Jones and have Smith machine them, the second column shows that Jones filled the order and that Smith has the stock. There are other columns for data about rough stock in storage, work in process and finished stock. In the last column is recorded the quantity of finished stock in excess of that required for either customers' orders for machines, customers' orders for repairs or factory orders for machines. The "material record" card is used for all special parts and assemblies, except that on one card usually is recorded information about three or more separate part numbers.

Production orders in the shop originate from one of the following sources: 1. Stock orders issued when the "material record" card shows stock has fallen to the "order point"; 2, orders to meet needs for stock machines; 3, orders to make parts for special machines or orders for slow-moving repair parts. The production department issues these orders, having received the customers' orders for machines and for repair parts from the engineering department and the stock orders for machines from the sales department.

The production department assigns the shop order a number, makes out the order tag, secures a drawing blue print from the blue print department, and on all standard parts also obtains a blue print copy of the routing sheet, which shows the standard time for each operation and which, therefore, is the basis for the company's gang bonus. These orders are listed and are forwarded daily to a cost clerk who heads up a cost sheet with the part number of the part ordered and the order number of the

factory order. The cost sheet is an ordinary ledger sheet on which are compiled labor, material and burden.

Cost of Every Machine Part Recorded on Card

When the cost order is completed, the average cost of pieces finished is computed and posted to a comparative cost card, 4 x 6 in., filed by part number giving the cost and quantity of each lot of that particular part manufactured. If a part is purchased from outside sources, the entry is made direct to the small cost card on which are entered the vendor's name and the cost of each part. Thus, the necessity of using the cost sheet is avoided.

For each machine built in our shop the engineering department prepares a "bill of material," which contains a list of parts or assemblies making up the machine. The list is priced from the cost cards and the total is entered on a ledger sheet called "machine cost." To the ledger sheet is posted assembly time direct from the labor tickets, and also any other material or labor that is charged directly to the machine. These lists are being compiled continuously, and thus at the end of each accounting period we have built up the factory cost of each machine shipped during that period. To the cost are added administration and selling expenses, the result being the cost of the goods sold.

At the end of each year we prove our costing by tabulating quantities from material cards, pricing them from our cost cards, adding miscellaneous labor from cost ledger sheets not closed out, and checking to our book inventory. In the few years during which this system has been employed, our discrepancies have been less than one-half of 1 per cent.

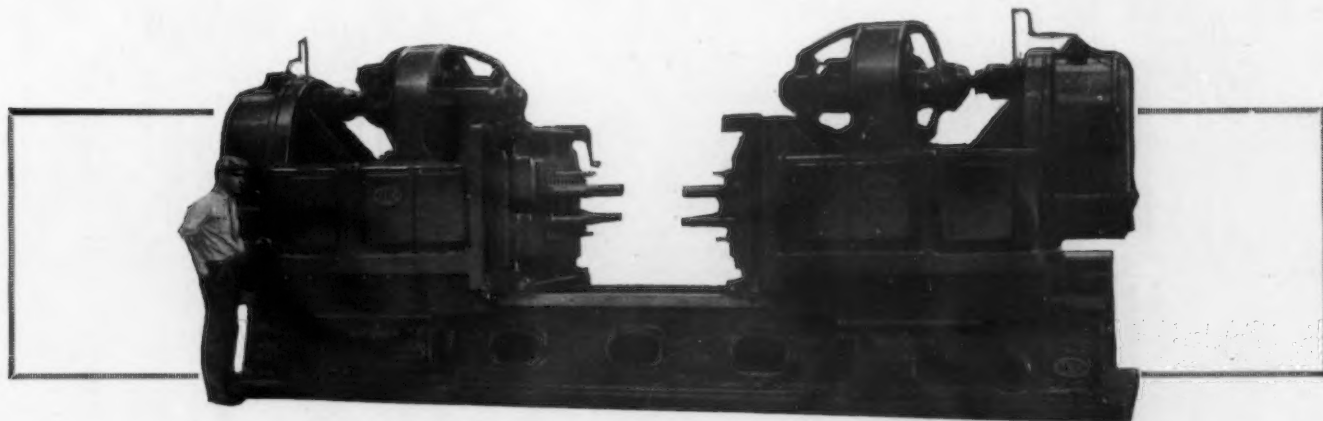
Our inventory of stores supplies is kept by our purchasing department on visible ledger sheets, and requisitions for supplies and for steel originate from this record. We open a new sheet for each order of material and show the unit cost, but do not attempt to show the money values. To arrive at our inventory of supplies we must multiply quantities as shown by these sheets by the unit cost as indicated. This obviates the necessity of entering on the supply sheets anything other than quantities when pricing requisitions.

"Material Record" Card a Perpetual Inventory

Whenever goods are received in the stockroom, a physical count is made of the entire stock of that part. This is checked against the material record card, which acts as a perpetual inventory. This plan has made it possible for the company to do away with an annual physical inventory.

Twice a year the material record cards are scanned to ascertain any parts which did not move in the previous six months. If the non-use is on account of obsolescence,

(Continued on page 690)



Heating with Blast Furnace Gas

Coke Ovens Arranged for Use of 85 to 100 B. T. U.

Fuel—Better Distribution of Heat and
Improvement in Coke Reported

H EATING of by-product coke ovens with blast furnace gas exclusively was begun, for the first time in this country, on Oct. 26, 1928, at the South Chicago plant of the By-Products Coke Corporation, Chicago. The combined gas washing and boosting plant, and gas piping to ovens, were designed and engineered by the Koppers Construction Co., Pittsburgh.

There are two batteries of 55 coke ovens each, Becker cross-regenerative type, 13.8 tons, erected by the Koppers Construction Co. and put into operation in January, 1925. They were designed to be heated with coal gas, producer gas or blast furnace gas, and up to this time had been heated with coal gas.

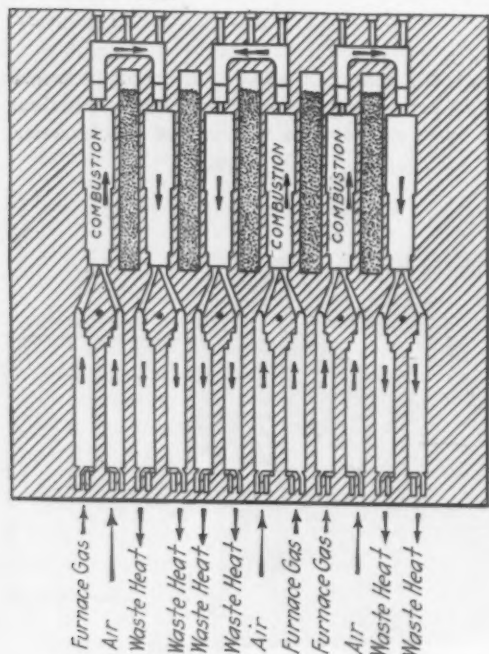
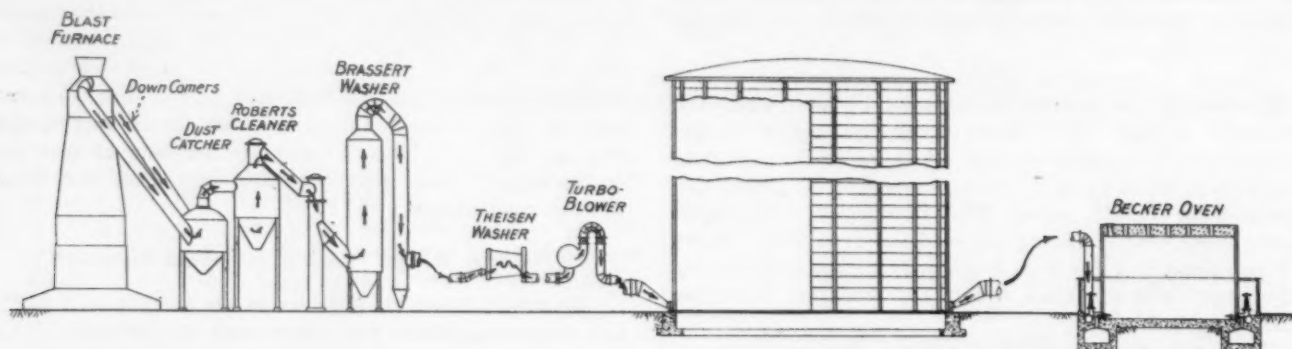
The economic value of underfiring coke ovens with blast furnace gas has been recognized for many years, and has been practised extensively in Continental Europe. While the By-Products Coke Corporation has been the first to introduce this system into a modern coke plant in this country, the Youngstown Sheet & Tube Co. began

during January, 1929, the heating of its new Becker-type ovens at South Chicago with blast furnace gas. The reasons underlying the decision to make the investment in this system may be understood from a brief outline of the economic conditions, and physical layout of the furnace and coke plants.

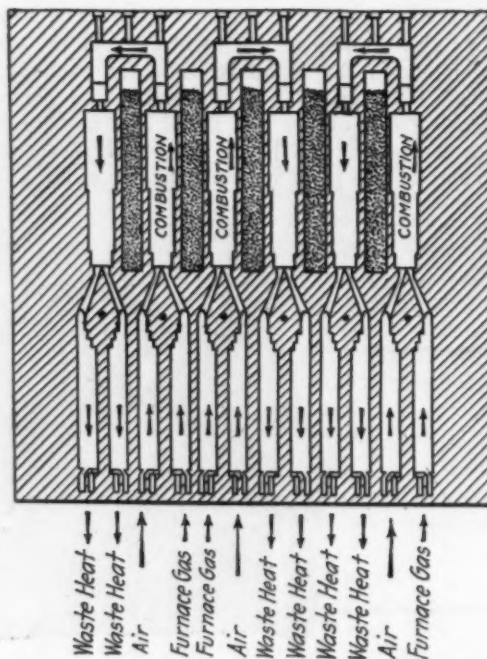
Purpose of Improvements

For several years the corporation had been studying the problem of utilizing to the best advantage the gas from its two furnaces, located at 108th Street and Calumet River, in South Chicago. Since there was no direct use for the gas, beyond heating the stoves, the surplus was used for generation of steam and, indirectly, electric power for operation of the furnace plant, a small excess being sold.

The coke plant supplying these furnaces is at 112th Street and Torrence Avenue, approximately one mile distant and separated from the furnaces by the Calumet



M ORE Than a Mile Separates the Blast Furnace (Left, Above) and the Coke Ovens at Extreme Right. Gas is transported to the ovens in a 60-in. pipe. At lower left is shown the oven arrangement for gas and waste heat flow when heating with blast furnace gas; at lower right is the same, with direction of gas flow reversed



River and by the main tracks of several railroads. Here coke breeze was being used under boilers for production of the plant's steam and electric power.

Two plans of action appeared feasible—(1) to utilize the excess furnace gas for the generation of steam and electric power to supply both plants, with a surplus to be

cleaner and Brassert washer on outlet of each furnace. To clean the gas further to the degree suitable for use in coke ovens, the Theisen type of wet scrubbing was chosen, on account of its proved efficiency and assurance of continuous, uniform operation. Five Theisen washers, having a capacity of 13,900 cu. ft. a minute each, were installed,

FIVE Theisen Washers and Three Turbo-Compressors, One of Each Being a Spare, Were Installed for Gas Service to Coke Ovens. Below are shown combination boxes for fuel gas, waste gas and air, and waste gas, as provided at the regenerators



sold, provided a sale could be arranged which would warrant the investment; (2) to use the furnace gas to heat the Becker ovens, and release the coal gas for sale as domestic gas. This plan included the production of steam power for the furnace plant from breeze, to be purchased from the coke plant.

The second plan was chosen, after balancing the values of the different forms of energy involved—blast furnace gas, coal gas, coke breeze and electric power.

Apparatus already in use for cleaning the gas consisted of dry dust catcher, Roberts and Kennedy dry

together with three Ingersoll-Rand turbo-compressors, one unit of each being a spare. The washers are driven by synchronous motors, the boosters by steam turbines.

The gas piping—extending over a mile—is mostly 60-in. riveted steel, including 400 ft. laid in a tunnel under the Calumet River. About 400 ft. of cast iron pipe is laid under railroad tracks and paving at 114th Street.

A 2,000,000-cu. ft. dry gas holder was erected at the coke plant, having a working pressure of 8 in. of water. It is equipped with elevator, tar conditioner, and distant type of indicator and recorder of height. By this means the operators at ovens and at washing plant know at all times the amount of gas in the holder. Electrical controls are provided which will automatically shut off the gas to the ovens, by means of the reversing machinery, in case the amount of gas in the holder should reach a fixed minimum.

Ovens Structurally Unchanged

At the ovens no changes in structure of the flues or regenerators were necessary. The furnace gas fuel mains were laid on each side of the batteries, just above the waste-heat canal, and combination fuel gas and waste-gas boxes were installed on one-half the regenerators. The flow of fuel gas, air and waste gases is the same as when underfiring Becker ovens with producer gas, and the reversing machinery is the same. Orifice type gas-flow meters and a recording calorimeter complete the equipment.

The new boiler house at the furnace plant contains four straight-tube high-pressure Connolly boilers of 640 hp., equipped with Greene stokers and Cash automatic control. One boiler is equipped to burn blast furnace gas as well as breeze.

The ovens have been heated with cleaned blast furnace gas of 85 to 100 B.t.u. for three months, without difficulty

of any kind, either in the cleaning, delivery of the gas, or heating of the ovens. The coking time has been 12.9 hr. gross and the underfiring 1090 gross B.t.u. per pound of coal. The change from coal gas to furnace gas was made at 14-hr. coking time, without difficulty, and the coking schedule was immediately reduced to 13 hr.

Coke is pushed at the same temperature as before, 1800 deg. Fahr., with an average air-port temperature 75 deg. less than when burning coal gas. This is due to more uniform distribution of heat, which became apparent immediately in the wall temperatures and in the appearance of the coke, which is more uniform in temperature and in size of pieces.

Better distribution of heat, reduction in percentage of excess air, and waste-gas temperature 70 deg. lower have resulted in underfiring figures equal to or less than those using coal gas. From tests of the waste gas at the stack it has been found that an amount of non-combustible impurities, equal to the small amount carried in the fuel gas, is being carried out of the stack by the waste gas.

There has been no increase in the routine labor of heating the ovens, other than inspection of the gas holder, which has been assigned to the heaters.

At the Theisen washer plant an average of 70 million cu. ft. of furnace gas a day is being scrubbed in four washers, using 1.65 gal. of water for each thousand cubic feet. This gas includes 6 million cu. ft. used for dilution of coal gas for underfiring three batteries of older type ovens. The amount of non-combustible impurities in the gas going to the ovens has averaged 0.013 grains per cubic foot of gas.

Only about 46 per cent of the coke from the Becker ovens is used in the furnaces. For this reason a typical energy balance, shown below, is for the case wherein the number of ovens heated with furnace gas is just sufficient to produce the coke required for the two furnaces. A coke yield of 70 per cent and a gas yield of 15,000 cu. ft. of 570 B.t.u. gas per ton of coke is assumed.

	B.t.u. Per Net Ton Coke to Furnace	
		Per Cent
<i>At Furnace Plant</i>		
Total in gas from furnace.....	13,450,000	100.0
Used in stoves.....	4,710,000	35.0
Underfiring ovens.....	3,110,000	23.2
Loss by bleeding (estimated).....	680,000	5.0
Available for other purposes..	4,950,000	36.8
<i>At Coke Plant</i>		
Total in coal gas.....	8,550,000	100.0
Surplus with coal gas heating.....	5,440,000	63.6
Released by furnace gas.....	3,110,000	36.4

For the typical case of coke and furnace plants, thus balanced as to production, the furnace gas required to heat the ovens is less than one-half of that available after heating the stoves. Based on operating results of the first three months, some of the advantages of the new system which are now apparent are:

- (1) More uniform distribution of heat to the walls of the ovens, and consequently to the coke.
- (2) More uniformity of temperature of coke as pushed, and of size of the pieces.
- (3) Notable improvement in smoothness of operation of the furnaces.
- (4) Greater uniformity of B.t.u. of furnace gas, resulting from easier operation of the furnaces.

Reducing Corrosion Trouble in Boilers

BY H. S. RAWDON AND K. H. LOGAN*

USE of some of the recently developed corrosion-resisting steels is one means of greatly reducing, if not entirely eliminating, corrosion trouble in boilers and allied equipment. Tubes of such steel are now being made commercially, but up to the present their use as boiler tubes has been of decidedly limited extent and is to be regarded still as more or less experimental. Variations in the chemical composition of present material for boiler construction, provided the material is of good commercial quality such as is required by current specifications, are not the determining factors so far as corrosion is concerned. As a rule, the seriousness of any case of corrosion is not caused primarily by the composition of the steel used.

On the other hand, steel which, according to the results of experience, should be entirely satisfactory to the purpose can be made worthless by the brutal treatment which it not infrequently receives in the erection of the installation. Corrosion of any metal is in that manner greatly accelerated and rendered more serious in its consequences, since localization of the attack usually results from any condition which causes non-uniformity in the metal. Cold working by rolling, expanding, shearing, punching and the like is one of the most potent sources of trouble of this kind. While excessive cold working is forbidden in some cases, as in the punching of rivet holes, in other cases it is a necessity, as in the expanding of tubes.

Any operation tending to produce abrupt changes in the structural conditions of the steel, either as changes in the visible structure or as that indefinite condition usually referred to as "internal stress," should be avoided as potential sources of trouble whenever corrosion is under

consideration. This is particularly true in cases of the so-called "caustic embrittlement" of boiler plate steel, a form of corrosive attack which manifests itself by the formation of cracks in the steel plate, suggesting that the metal has undergone a complete change from a ductile material to one almost entirely lacking in this quality.

As a matter of fact, the metal is essentially as ductile as ever. The embrittlement has been the result of the action of a corrodent upon the metal while it was under stress. The combination of these two conditions gives rise to the cracking of the metal by the formation of inter-crystalline fissuring, a phenomenon which has also been noted with a variety of metals when subjected to stress and corrosion simultaneously. The occurrence of a condition of internal stress such as results from excessive cold working, as mentioned previously, is favorable to this type of corrosion.

Corrosion from furnace combustion products is confined practically entirely to the relatively cooler portions of the furnace systems. The principal combustion products of coal and oil have no corrosive effects whatsoever upon iron and steel at temperatures prevailing in service. It is the impurities in the fuel, particularly sulphur, to which the trouble can be attributed. Even these products, however, are seriously injurious only to the extent to which condensation occurs. The use of special corrosion-resisting steel of the stainless type is beyond consideration. There is no simple and sure preventive for this type of corrosive attack. Anything in the nature of a paint coating is considered only of short-lived usefulness.

While no recommendations based upon service can be made, it would seem that, inasmuch as the corrosive attack is essentially that of an acid, steel which has shown itself to have superior acid-resisting properties under other conditions should, in general, be more suitable for construction work of this kind.

*Respectively metallurgist and electrical engineer, Bureau of Standards, United States Department of Commerce, Washington. Abstract of paper before the Mid-West Power Engineering Conference, Chicago.

Making Metals to Resist Corrosion

CORROSION and corrosion-resistant metals formed the subject of well attended meetings on Feb. 21 of the Institute of Metals section of the American Institute of Mining and Metallurgical Engineers. The annual lecturer, Ulick R. Evans, Cambridge University, is a foremost British authority on such subjects, and in an address on "Passivity of Metals" he correlated many recent researches, both of his own and of other Europeans. He is a supporter of the theory that freshly abraded iron rapidly acquires a thin (though transparent and invisible) coat of oxide by reaction with oxygen in the air, and the subsequent corrosion phenomena must be interpreted in the light of chemical reactions between surrounding media and this layer of oxide. Some years ago he was able to separate these thin films from metal; photographs and actual samples were exhibited. Most of the lecture was given to a discussion of the way a strip of electrolytic iron behaves when partially immersed in solutions of acids, alkalis and inorganic salts. If no corrosion ensues, he holds that the nature of the reactions builds up and maintains a continuous protective film, usually oxide. Corrosion occurs only when this film is destroyed or perforated locally; action is electrolytic—the unattacked protected portion becomes the cathode; the bare portions are the anodes, and solution of iron occurs at the latter places.

Rust is not a direct oxidation product but a precipitate formed by secondary reactions; direct oxidation forms the adherent invisible film of anhydrous oxide, iron rust is a mixture of hydroxides. Doctor Evans offered an explanation, based on these principles, of many curious phenomena of water-lime attack, pitting, and differential corrosion by various solutions. Details must be obtained from the full text of the address.

Electrolytic Theory of Corrosion Upheld

IT was mentioned that recent rapid advances in the understanding of corrosion have been due to precise studies, where all disturbing factors have been rigidly excluded. An instance is contained in researches described by G. D. Bengough, J. M. Stuart and A. R. Lee of the National Physical Laboratory, Teddington, England, in a paper entitled "Quantitative Measurement of Corrosion of Metals in Water and Salt Solutions." This work of high precision would delight a chemist skilled in atomic weight determinations. A disk of spectroscopically pure zinc, annealed in an atmosphere of argon, is transferred into a closed system of glass apparatus. The zinc is immersed at a given depth in conductivity water, above which is an atmosphere of purified oxygen. The entire equipment is maintained at constant pressure and temperature in a thermostat, and the amount of corrosion measured at daily intervals by measuring the absorption of oxygen. In this way the amount of oxidation may be measured without disturbing the specimen. When plotted against time, the curve for corrosion in dilute chloride solutions conforms almost perfectly with a mathematical equation derived on the assumption that the action is electrolytic in character.

Effort continues, especially among American investigators, to find a good measure of corrosion, and to corre-

Aluminum-Clad Duralumin Not Subject to Embrittling—Black Tarnish in Tin Cans Prevented by Zinc Oxide Enamel—Alloys for Hot Hydrochloric Acid

late laboratory and service tests. H. A. Bedworth of the American Brass Co., Waterbury, Conn., has studied the action of dilute acids on wires drawn from "Everdur" (silicon 0.5 to 4 per cent, manganese one-third the silicon, balance copper) by measuring the change in tensile strength and elongation after immersion for definite time.

This method evaluates the importance of localized attack and intercrystalline penetration, a species of damage which loss or gain in weight does not properly measure. Best resistance to 10 per cent HCl or H₂SO₄, either cold or at 60 deg. C., is had with the silicon content at 2.5 per cent.

Causes and Remedies for Brittle Duralumin Strip

SIMILAR comparisons on full-sized test bars cut from duralumin strip have been made by H. S. Rawdon of the Bureau of Standards, Washington, in an effort to learn the cause of embrittlement sometimes found in this material. Samples with apparently unchanged surfaces and good tensile strength have been found to be deficient in ductility. Microscopic examination of such material shows cracking between the crystals; these tiny cracks branching out below the surface. As reported in a paper "Correlation of Laboratory Corrosion Tests with Service and Weather Exposure Tests of Sheet Duralumin," Mr. Rawdon now finds that samples which are rapidly embrittled by repeated immersion also develop this defect after long-time exposure to the atmosphere. Such a correlation emboldens him to reach the following conclusions from extended laboratory studies:

1. Embrittlement is due to localized corrosion.
2. It is more likely to occur in duralumins containing copper.
3. Chloride solutions cause most rapid damage.
4. Warm weather also accelerates the action.
5. Duralumin quenched in cold water before aging is more resistant than that quenched in hot water or hot oil before aging. Accelerated aging (at higher than room temperature) also renders the metal susceptible to intercrystalline corrosion.
6. Cold working, either general or local, is a minor factor compared to (5).
7. Oxide coatings formed by anodic treatment are efficient preventatives only if kept well greased.
8. Clear spar varnish is of slight value; addition of aluminum powder is of value as long as the covering does not blister.
9. Metallic aluminum coatings give most excellent protection, even at bare edges. This metal coating can be sprayed on, or formed by rolling a duplex slab.

E. H. Dix, Jr., Aluminum Co. of America, New Kensington, Pa., said that he also found close agreement between exposure-to-weather tests and alternate immersion with salt and H₂O₂ solutions in the laboratory, as well as exposure to salt spray. He was of the opinion that intercrystalline corrosion of duralumin is due to the different solution potential of the homogeneous metal in the body of the crystalline grains and the material at the grain boundaries, which may contain segregates or precipitates. Hence the necessity of using a metallic alloy and a heat treatment which will avoid such heterogeneities. He has found that a little silicon and artificial aging cause even more rapid embrittlement on exposure than Mr. Rawdon reports. He believes cold rolling increases the resistance to corrosion because it breaks down segregates at the surfaces. Coatings of pure aluminum merge into the underlying metal through a diffusion zone which itself is

protective, hence pits do not form where the aluminum coating is perforated. Duralumin rivets 1 in. in diameter are also protected from corrosion by the pure aluminum at the edges. Anodic coatings, in his opinion, are chiefly valuable as a somewhat porous base into which paint can bond itself.

Steels Weakened by Mild Corrosion

CORROSION has a pronounced effect on the physical properties of other metals besides duralumin. D. J. McAdam, Jr., metallurgist United States Naval Engineering Experiment Station, Annapolis, Md., presented another paper drawn from his extended researches on the fatigue of metals. In it he attempted to correlate corrosion, time, and endurance limit. T. S. Fuller, research laboratory, General Electric Co., Schenectady, N. Y., also described some tests indicating that hydrogen absorbed by steel during corrosion is in part responsible for a lowered endurance limit. An interesting appendix to Mr. McAdam's paper showed that the static properties may be materially affected by a mild corrosive attack—this being related to the well known "season cracking." He cited tests on a hardened silicon-nickel spring steel as follows:

	Breaking Strength
Tensile specimen broken in ordinary way	250,000 lb. per sq. in.
Quiescent load, specimen immersed in tap water	175,000 lb. per sq. in.
Alternate load and rest, 30 min. intervals, specimen immersed in tap water	115,000 lb. per sq. in.
Specimen corroded in carbonate water, dried and oiled; tested dry with 30 min. alternations ..	200,000 lb. per sq. in.
Endurance limit, rotating cantilever, dry	108,000 lb. per sq. in.

"C-Enamel" Prevents Blackening in Tin Cans

CORROSION of metals used by the dairying and food packing industries was discussed in two contributions to this symposium. One on "Resistance of Nickel and Monel Metal to Corrosion by Milk" was presented by R. J. McKay, O. B. J. Fraser and H. E. Searle of the development and research department, International Nickel Co., New York. About 58,000,000 tons of raw milk are handled in the United States every year, and chemical reaction between containers and this highly perishable and complex substance must be minimized. Both nickel and monel metal may be readily fabricated into dairy equipment, and the average amount of nickel found in bottled milk handled entirely in nickel is found to be 1.3 parts per million. (Compare the legal limit of copper in foods of 30 parts per million.)

C. L. Mantell, Pratt Institute, Brooklyn, presented an encyclopedic summary of the facts known about the corrosion of tin and its alloys. An important section has to do with tin cans. Dark discoloration or "can black" is due to hydrogen sulphide generated by legumes (corn, peas or beans) forming tin sulphide and iron sulphide. Perforation is due to electrolysis at pits in the coating, either imperfections in the original coating, or bare spots caused by actual solution of the tin in the liquid contained. It is well known that tin accelerates corrosion of the steel base where the latter is exposed. Pitting and perforation are commonest in fruits and berries put up in sugar solutions, which while weak electrolytes do not become polarized, as do the saline solutions used for vegetables. Organic acids in spinach, pumpkin, rhubarb and apples actually dissolve the tin.

A major improvement in containers, known as "C-enamel lined cans" successfully prevents can black. C-enamel is a lacquer containing a tiny amount of zinc oxide, baked on under precise heat control. Paper liners have also been used for sea foods. Much trouble has also been cured by using heavier tin coatings and by modifying the cooking and packing routine. Even so, beets, rhubarb,

cider and several varieties of berries cannot be preserved in tin cans. Despite these limitations, there has as yet appeared no satisfactory substitute for the eight billion tin cans used every year in the United States.

Systematic Study of High-Chromium-Nickel Steels

IN view of the fact that stainless steel and several austenitic chromium-nickel steels have recently been recommended for non-corrosive chemical equipment, a systematic study of the iron-nickel-chromium system was undertaken by N. B. Pilling and D. E. Ackerman, in the research laboratory of International Nickel Co., Bayonne, N. J. About 90 melts ranging from pure iron to pure nickel and various intermediate proportions up to 30 per cent chromium were made. After forging into bars, 1 in. by 3/16 in. disks were machined therefrom. These were then exposed to various acids under standardized and closely controlled conditions of temperature, aeration and motion. Results were computed to milligrams per square decimeters per day (abbreviated as mdd.); a rate of 1000 mdd. is equivalent to a penetration of about 0.17 in. per year.

It was found that when the alloys are attacked by acids which liberate hydrogen, about 15 per cent nickel, regardless of the iron or nickel proportions, gives the maximum immunity. Thus, any iron-chromium-nickel steel containing 15 per cent nickel or more will corrode no more than 700 to 1000 mdd. in 5 per cent HCl, in H₂SO₄, up to 30 per cent, or in formic, lactic, acetic, tartaric or citric acids. In nitric and sulphurous acids, however, chromium seems to be the element conferring immunity. All combinations containing more than 20 per cent chromium corrode in 5 per cent HNO₃ at less than 500 mdd., and less than 10 mdd. in 5 per cent sulphurous acid. The latter rate is largely increased by minor impurities in solution. While heat treatment has some influence on these rates, corrosion is independent of the microscopic appearance of the alloy.

Alloys Impervious to Hydrochloric Acid

IN a paper entitled "Some New Developments in Acid-Resistant Alloys," B. E. Field of Union Carbide & Carbon Research Laboratories, New York, described experiments with a series of nickel-molybdenum alloys where he found that with 15 to 47 per cent molybdenum the corrosion in 10 per cent HCl at 70 deg. C. approached zero. In efforts to discover if possible a less expensive combination, a series of alloys containing 20 per cent molybdenum, balance iron and nickel, was investigated. Contrary to expectations, such metal with 20 to 30 per cent iron lost less than 0.0002 gm. per sq. cm. per hr. in hot acid. A final alloy was chosen of the following composition:

Iron	20 per cent
Molybdenum	20 per cent
Carbon	0.2 per cent
Manganese	3.0 per cent or less
Silicon	Less than 0.5 per cent
Nickel	Balance 57 per cent

Thirty-seven per cent hydrochloric acid at room temperature will penetrate this alloy at the rate of 0.00003 in. per month. At 70 deg. the penetration is about 0.002 in. per month, only one-tenth that of the most resistant alloy now on the market. It is readily machinable, can be hot rolled into sheet and cold rolled for a smooth surface. Excellent castings may be made. Oxy-acetylene welded joints have the same resistance to HCl as the unwelded sheet. Physical properties of forgings are:

Ultimate strength	112,000 to 117,000 lb. per sq. in.
Yield point	52,000 to 69,000 lb. per sq. in.
Elongation in 2 in.	33.5 to 24 per cent
Reduction in area	38 to 31 per cent
Brinell hardness	207 (average)
Erichsen test on annealed sheet	8.0

Another alloy for sand casting which withstands 10

per cent HCl very well (but is not so good for the stronger concentrations) has the following composition:

Silicon	10 per cent
Aluminum	1.5 to 2.0 per cent
Copper	3 per cent
Nickel	Balance (85 per cent)

Since its Brinell hardness is 364 it is machinable only with tungsten carbide tools, nor can it be forged. Transverse test bars give results somewhat above gray cast iron, and about five times those of commercial iron-silicon alloys used for acid resistance.

Selecting Steel for Sucker Rods

High Quality and Careful Heat Treatment Necessary—Failures Due to Fatigue—Two Types of Rods Used

BY W. H. LAURY*

EVOLUTION of the sucker rod began in 1890 when wooden rods with crimped screw end connections were used in the Pennsylvania fields. It was in water wells that most of the veteran California oil men saw the first wooden rods used.

Two Types of Sucker Rods Used

Sucker rods now universally in use are of two distinct types as regards their end connections—the “pin and box” type and the “double pin” type. The former is used in the Eastern shallow fields and in Mid-Continent, while the double pin type is used almost exclusively in California, about 60 per cent in Mid-Continent and only slightly in the East. Both types have their advantages, but usage is based on the preference each operator has for one or the other design.

Selecting Steel for Sucker Rods

Sucker rod steel therefore should be selected with the following factors of paramount importance:

Uniformity of analysis.

Uniform hot metal practice and control of rolling temperatures to secure uniformity of product.

Proper cropping of blooms and chipping, if necessary, to insure soundness of material.

The interest mill personnel take in your product.

Precautions of “alloy practice” should be implicitly adhered to in the manufacture of steel for sucker rods. A structural, or a commercial, bar mill organization habitually does not turn out a steel sufficiently sound and uniform (heat after heat) for use in the manufacture of sucker rods, because such precautions have never been required for the manufacture of their immediate product. The desirable physical characteristics include ductility and toughness, which depend in large measure on cleanliness and refinement. Hot acid etching tests of bar cross-sections from each lot will provide a check as to the soundness of mill practice.

Temperatures for Upsetting the Rods

Forging temperatures of between 2250 and 2300 deg. Fahr. are required for the upsetting of the rod ends. The time to heat, time at heat and depth of insertion in the open-end furnaces should be maintained with extreme accuracy to insure duplication of results, and the use of pyrometric recording automatic control mechanisms on such heating furnaces is quite satisfactory. Pyrometer and automatic control valves should be maintained in good order to guarantee uniformity.

*Mr. Laury, whose paper before the Western Metal Congress of the American Society for Steel Treating at Los Angeles is here reviewed, is research engineer, Axelson Machine Co., Los Angeles.

The upsetting operation is completed on a No. 2 Ajax forging machine, each rod end requiring four die passes and one trimming pass; all this is accomplished on the original forging heat. Deformed or improperly die-filled upsets are rejected as the practice of re-forging causes cold shuts and laps. Slow muffled cooling from upsetting eliminates many cooling stresses, and water or live steam, if kept on dies for cooling, should never be allowed to trickle on the rods during the process of upsetting.

Careful Heat Treatment Necessary

Pin ends are now heat treated by practically all manufacturers. The upset rods, as they leave the slow muffle cool, are moved on a conveyor table to a battery of automatically controlled electric furnaces where the pins are heated to 1525 deg. Fahr. and quenched; a subsequent draw at 1000 deg. Fahr. follows in the same continuous operation. Regularly, miniature tensile and standard Brinell tests are taken on pin ends removed from the production line. However, on pin end treatment, regardless of the ratio of pin cross section to rod area, it must be remembered that the longitudinal rolling direction is considerably distorted, verging on a transverse flow in the upsetting operation and, regardless of the heat treatment, the pin has a different characteristic than a similarly heat-treated piece taken longitudinally.

Failures Due to Fatigue

A close observation of a number of rod and pin failures in the fields discloses the fact that although the steel, in the majority of cases, is capable of withstanding a flat bend test, the actual fracture has the appearance of that of a brittle metal and does not show the reduction of section commonly observed in tensile testing machine breaks. Such observations lead immediately to the conviction that the failures are owing to “fatigue” rather than to tension. Present study of “fatigue” failures has resulted in their definition as “failures caused primarily by the effects of alternating stresses which are generally of a magnitude much below the actual elastic limit of the metal.”

Sucker rod failures will never be entirely eliminated and, because fatigue is the cause of the vast majority of such failures, steel mill metallurgists should give sucker rods more thorough research to develop a less costly yet greater fatigue-resisting steel for sucker rods. The rod manufacturer, who is dependent upon the mill for his rolled rods, should maintain the strictest inspection on the raw material furnished, and should have the stages of his own fabrication operations strictly supervised by competent men qualified to control production of extremely precise and sound products.

A. B. C. of Chromium Plating

REASONS are given in simple words for the fact that chromium plating baths operate in narrow temperature limits, that the current efficiency is low, that uncorrodable anodes, tanks and fittings are required. Useful information is given on design of equipment, and the means of controlling the composition and temperature of the bath. It is emphasized that the qualities of the final finish also depend to great extent upon the cleanliness, smoothness and nature of the under-surface.

BY RICHARD SCHNEIDEWIND*

CHROMIUM plating as a commercial process has been adopted with surprising and increasing rapidity in the last five years. Manufacturers have found the public quite ready to accept the bluish brilliance of chromium as a standard of elegance and good taste. Coatings have been used to decorate radiator shells, bumpers, and headlamps on automobiles, plumbing fixtures, household appliances, and even jewelry. Not only is chromium attractive for its luster, but unlike other metals used for the same purpose its brightness is not dimmed by weather, nor is it tarnished by atmospheric conditions, nor by the smoke and fumes ordinarily found in big cities. On automobile fittings chromium plating is applied also as means of protecting the base metal, usually steel, from rusting. A very thin coating, even a few hundred-thousandths of an inch in thickness, when applied over the usual nickel plate, will increase the resistance to corrosion two or threefold. These qualities have been responsible for the increasing popularity of chromium plating.

Properties of Chromium Plate

Electrodeposited chromium is a bluish metal which, if properly applied, has a brilliant luster quite similar to that of polished platinum. In thin layers it is used as above noted; in thick layers it is used to increase resistance to wear. However, chromium plating on steel without intermediary coatings of copper, nickel, or other metals, is of less value in protecting against corrosion in the extremely thin deposits ordinarily produced due to its tendency to be porous. Unless the undercoating is of moderate thickness the plate will corrode rapidly, especially where the undercoating is copper. Increasing the thickness of the chromium deposit over a nickel-copper-nickel undercoating, increases the resistance to corrosion proportionately. Beyond this optimum thickness the rust resistance of most commercial plates decreases in a way that has not been anticipated.

Chromium used in thick layers for wear resistance is found in automobile parts, such as wrist pins, steering knuckles and brake parts, and in stamping dies, extrusion dies, roller faces, and plug gages. There are two characteristics which distinguish it from other metals and fit it peculiarly for such service. These are its hardness and its smoothness. The following table of comparative

scratch hardness will give a fair idea of the hardness of a chromium plate as compared with other metals:

Chromium in electrodeposited plate..	2000
Case hardened steel.....	1950
Steel shafting	750
Swedish iron	408
Bronze	244
Babbitt	208
Copper	78

As for the "smoothness" of chromium: its coefficient of friction is so low that greaseless bearings have been made in which the sliding surfaces carry a fairly heavy coating of the metal. It is doubtful, however, whether this procedure could be used commercially in many places.

The greatest defect in thick coats of chromium is a pronounced tendency for the metal to crack when struck a blow or when a varying load is applied to it. Some of this can be ascribed to inherent brittleness of the excessively hard plated film. Treatments such as heating in a vacuum to remove hydrogen absorbed during the plating process, have been suggested and may be of some value, for according to F. M. Becket, pure chromium is ductile and can be cut with an ordinary hack saw.

On polishing across a specimen of heavy chromium plate, and examining it under a microscope a number of voids will be found in the deposit. Sometimes these voids will be so aligned that a fissure extends to the base metal. Although usually the holes are not so connected, it is obvious that such a material, brittle to begin with, cannot withstand much shock.

There is undoubtedly some correlation between plating conditions and the number of voids in a commercial deposit. This, however, has not yet been fully investigated. A few isolated tests by the author would lead to the conclusion that the hotter the bath, or in other words the more rapidly the metal is built up, the more pronounced the voids.

The Process of Electrodeposition of Chromium

Electroplating in general is accomplished by passing an electric current from one electrode to another through a bath containing in solution the metal which it is desired to deposit. For example, in nickel plating, a nickel rod is used as the positive electrode, while the object to be plated becomes the negative electrode. These two poles are immersed in a bath of nickel sulphate and an electric current passed through, causing the nickel rod to dissolve gradually and replenish the bath from which nickel is simultaneously being deposited upon the surface to be plated. In this manner a cycle is set up: nickel rods,

*Assistant Investigator, Department of Engineering Research, University of Michigan, Ann Arbor. This article is compiled from information gathered during a research program financed by Detroit Edison Co., and published in the University in Engineering Research Bulletin No. 10, entitled "A Study of Chromium Plating."

called anodes, and current are constantly supplied to the process, and in return nickel is obtained as a coating upon the objects hung in the bath.

The deposition of all metals follows very definite laws. Normally a certain amount of electric current will transfer a definite amount of metal from anode to cathode. If less metal is deposited on the article to be plated than should be theoretically obtained, it is said that "the cathode current efficiency is low." Cathode current efficiency is expressed as the ratio in per cent between the amount of metal deposited and the amount theoretically calculated. Anode current efficiency is the ratio between the amount of anode actually dissolved and the theoretical amount.

Anodes

IN most plating processes new metal is supplied to the bath in the form of anodes which dissolve in the plating solution at approximately the same speed as metal is deposited. There are only two well known exceptions: the electrodeposition of platinum and chromium. Insoluble anodes are then made use of, and the bath is replenished by means of metallic salts.

Soluble anodes of chromium metal, however, are not entirely unknown. Important objections to the use of soluble anodes in chromic acid baths have recently been raised. The current efficiency of chromium and ferrochromium anodes is much greater than the cathode current efficiency. This means that during electrolysis chromium goes into solution at a more rapid rate than that at which metal is depositing from the solution. Hence, the concentration of chromium, especially the trivalent chromium, builds up rapidly and the bath becomes inoperable.

Only in compound solutions of divalent and trivalent salts of chromium have chromium anodes been found entirely satisfactory. But even in such baths insoluble lead anodes have been used. With soluble anodes the bath would rapidly become too rich in chromium.

Therefore in the majority of installations insoluble anodes are used. Researches have definitely narrowed the selection of possible materials to two; namely, iron and lead. If lead anodes are used, the bath will be maintained in a very good condition because trivalent chromium formed during electrolysis is readily reoxidized by lead anodes. Some grades of lead corrode in such a manner that adherent patches of lead chromate are formed and exert a detrimental effect upon the plate. Iron anodes, on the other hand, always remain clean, but they permit a greater accumulation of trivalent chromium in the bath than lead anodes and iron goes into solution increasing its resistance and thereby increasing both the power necessary for plating and the attendant power costs. The purer the iron the slower will be the rate of solution. These factors must be considered in making a choice of anode materials. If properly taken care of, lead anodes are preferable.

Tanks

THE plating bath may be contained in a lead-lined wooden vat, or in glass-lined steel tank, but a common procedure is to use a steel tank with joints welded inside and out. Steel and iron become passive in chromic acid and are but slightly attacked. As has been pointed out before, sheet lead or steel anodes may be hung in the bath or a steel tank itself may be connected anodically.

Heating and cooling coils of lead or steel are usually installed to control the temperature readily, one for cold water, the other for steam. The water coil is used infrequently, because in general there is so much evaporation and conduction that heat needs to be added. In some installations steam and water may be supplied to the same coil as needed. In others two tanks may be provided, the inner one being separated from the outer by a space of

several inches. Water in this space is heated or cooled by coils. This procedure avoids the difficulties often encountered in finding materials for coils which will satisfactorily withstand chromic acid.

Thermocouples or thermometers inserted in the tank operate a thermostat which regulates the steam input. Refined practice also calls for automatic temperature controlling and recording devices. In Europe, plating is very often done at room temperature or lower; regulation is then accomplished by proper manipulation of the cold water line. This practice, to be sure, often results in dull plate, but since the current efficiency is greater than when bright plate is produced, and since labor for buffing is cheap, it is claimed to be an economical process both in England and on the Continent.

Deposition of chromium is attended by a copious evolution of hydrogen and oxygen gases carrying a chromic acid spray. This fume is very irritating to the mucous membranes; exposure over a long period of time leads to bad head colds, nose bleed and even ulceration in the nasal passages. For this reason fume ducts are generally installed very near the surface of the bath and exhaust fans pull the fumes directly across the solution and downward. Attempts to pull the fumes upward failed because the spray is very dense. European installations sometimes are equipped with traps to collect this spray, which is returned to the tank periodically.

The Bath

THE plating bath has chromic acid as its main constituent. Its function in the bath is twofold: to conduct the electric current, and to supply the chromium. During operation, chromic acid must be added from time to time.

A solution of chromic acid alone will not yield commercially valuable deposits. It is essential that small quantities of sulphate or its equivalent be added; it should amount to about one per cent of the chromic acid used. The most convenient way of adding sulphate is by putting in sulphuric acid; chromium sulphate, sodium sulphate or any such material, however, can be substituted.

If there is a deficiency of sulphate, the resulting deposit will contain areas of brown hydroxide. As the amount of sulphate approaches normal, the quality of the plate is improved. When too great an amount of sulphate is present, good plate can be obtained only in a very narrow range of plating conditions. Still more sulphate makes the bath entirely inoperable.

That plating bath is usually quite strong; chromic acid concentration in a recommended formula is about 250 grams per liter (32 ounces per gallon), the sulphate concentration 2.5 grams per liter (1/3 ounce per gallon). A stronger or weaker solution may be used, but the two must be in about the same relative proportions. Many baths contain other constituents either added intentionally or formed during use, but most substances of this nature are detrimental to the deposit.

The greatest obstacle in the way of control has been the rather difficult methods of chemical analysis. Fortunately the composition of a bath does not fluctuate greatly nor change as rapidly as, for example, a nickel plating solution. The concentration of chromic acid can be determined by a simple titration; proper additions can then be made to the bath. On the other hand, the analyses for trivalent chromium and iron are not quite so easy. Analysis for the latter element need to be made infrequently, and if lead anodes are used, no iron will enter the bath.

The cathode—the article to be plated—must be carefully cleaned of all grease, oil and oxide.

Grease and oil are removed by cleaning in a hot solution of alkali, preferably with the aid of electric current (the piece is made the negative pole). Some foreign

authorities do not believe cleaning to remove grease is a necessary step and they depend largely upon the detergent effect of the chromic acid plating solution.

Oxide is removed by pickling in acid; a solution of sodium cyanide works admirably on copper and brass. After it is rinsed, the piece is immersed in the chromic acid plating bath, connected to the negative side of the circuit, and the current applied.

When plating with nickel, silver, copper, or almost any other metal, and a small current is applied, deposition takes place slowly; if a large current is applied, deposition is rapid. The amount of plate formed is dependent upon the total amount of current supplied. Chromium deposition is much more complicated. If a very low current density* is used, the current merely reduces the chromic acid to trivalent chromium without any deposition of metal whatever. As the current density is increased, a sudden evolution of hydrogen is noticed at the cathode. Upon examination it will be found that, in addition to reducing chromic acid as before and liberating hydrogen, the current has also deposited chromium. Under 5 per cent of the current at this stage actually is used in metal deposition. The plate is generally milky in appearance. Increasing the current density increases the current efficiency and the resulting deposit is brilliant. If put on a buffed surface, the plate will be so bright that no subsequent buffing is necessary. Increasing the current density still further so that the current efficiency rises above 20 per cent results in a gray, matte deposit which in thick layers may crack and peel badly. When depositing upon metals such as copper and brass, a comparatively wide range of current densities will produce good plate; on other metals such as nickel and iron narrower control must be enforced.

Changing the temperature of deposition shifts this range of current density wherein commercial deposits may be made. For example, at room temperature a given solution will give good deposits on copper if the current is anywhere between 20 and 80 amp. per sq. ft. (2.2 and 8.8 amp. per sq. decimeter); at 60 deg. C. the limits are between 70 and 600 amp. per sq. ft. (7.7 and 66 amp. per sq. decimeter).

Current Efficiency Always Low

Although the range of current densities producing good deposits increases with the temperature, the current efficiency remains nearly the same. That is, good plate for decorative purposes will be obtained at a current efficiency between 5 and 20 per cent regardless of the temperature. If thick deposits are desired, a combination of current density and temperature to give about 13 per cent current efficiency will form a bright, smooth plate with the minimum tendency toward treeing.

If the bath contain other things in addition to the

*Current density is current per unit area, and is usually expressed as amperes per square foot or amperes per square decimeter.

essential chromic acid and sulphate or its equivalent, unfavorable conditions will result. For example, the formation and the accumulation of trivalent chromium increases the resistance the bath offers to the passage of the electric current. It also greatly contracts the plating range already described. Dissolved iron also increases the resistivity of the solution.

Bright chromium surfaces are obtained by plating on bright undercoatings. It is also easier to obtain fine finishes by plating on a buffed undercoat of a metal like nickel than upon buffed copper. Dull chromium can be brightened by using a special buffing compound, although this procedure is generally uneconomical and unnecessary.

Control is a necessity. In plants doing good work there will be found thermostatic temperature control, recording thermometers, accurate ammeters, good fume exhausters, and periodic chemical analyses. There is, however, no great measure of uniformity in the quality and extent of the control methods at the present time.

Miscellaneous Notes on Control of Plating and on Nature of Deposits

Changes in plating conditions or in bath compositions, seemingly of a trifling nature, can profoundly alter the nature of the results. A current density capable of producing bright plate at one temperature may at a temperature 10 deg. higher be unable to produce any plate whatsoever. A change in sulphate concentration amounting to 0.2 per cent (2 grams per liter) can completely ruin a bath which had previously been operating satisfactorily.

Conditions such as these all require workable means for control. There is still a great deal to be done before satisfactory control methods will be evolved. However, good practice of today has standardized some procedures which have met with sufficient success to recommend them.

Control of current density does not usually offer any great difficulty to the plater. With a given solution, in a tank where anode to cathode distances are fixed, it has been found fairly satisfactory to regulate according to the voltage. Pieces of irregular dimensions cannot easily be plated otherwise. Although the area and the amperes necessary to produce a certain average current density can be obtained, yet high points may be burned due to locally higher current densities. Some shapes are best plated by surrounding them by a loop of copper wire, which acts as a "robber" and takes the highest current densities and leaves the piece in an area of relatively constant current density.

Great ingenuity is displayed in designing the details of a plating installation such as the exhausting system, the connections between bus bars and anode or cathode rods, and the racks for the work. Good electrical contacts are necessary everywhere. Some tanks are lined with reinforced, wired glass to prevent stray currents. Many such devices are making the control of a chromium-plating plant simpler and more satisfactory.

How Can Steel Compete Better with Concrete?

A RECENT article in the French engineering journal, *Le Genie Civil*, makes some comparisons between reinforced concrete and steel frame construction. It states that reinforced concrete has made astonishing progress during recent years from the point of view of economy, but that metal construction in the same period has scarcely made any advance. Improvement has also been made in the quality of cement, in the artistic finish of reinforced concrete buildings, and in the methods of building forms. Consequently when reinforced concrete is brought into

competition with metallic construction it is usually adopted, frequently with considerable saving in cost.

These facts lead to the conclusion that if metallic construction is not to become obsolete the quality of the material must be radically improved. There must be developed a steel of high strength and stiffness so as to lighten the construction. Changes in design of the frame-work should also be directed toward economy of material, not only in eliminating fabricating waste but to avoid useless metal in the permanent structure.

Economies Through Special Tools

Standard Equipment Altered and Special Machines Built to Facilitate
Manufacture of Pulleys

BECAUSE of the special nature of its product, the Rockwood Mfg. Co., Indianapolis, manufacturer of paper pulleys, has found it necessary to design and build many special attachments for standard machine tools, and a number of machines especially adapted to its particular requirements. A few of these tools, including two broaching units, use of which has contributed substantially to economical production, are shown in the accompanying illustrations.

To correct slight foundry irregularities, rough pulley hub castings are forced through hardened steel rings having a cutting edge on the upper surfaces. These hub castings usually have V-shaped ribs extending from end to end, which precludes the possibility of turning. To obviate this difficulty the broaching operation shown in Fig.

1 is resorted to. As the hubs drop through the ring, they are elevated by a chain conveyor and are dropped into trucks. This machine was built by the company.

The bores of the larger sizes of pulley hubs are broached on the vertical hydraulic broaching machine shown in Fig. 2. This machine is operated by a Hele-Shaw pump coupled direct to a 25-hp. motor, the hydraulic cylinder being located in a concrete pit below the floor. It has a 5-ft. stroke and will pull 125 tons.

For the Chard engine lathe shown in Fig. 3, a special tailstock has been constructed, the sliding sleeve being operated by a self-locking toggle lever. Mounted in the sleeve is a hardened and ground ball-bearing spindle with a taper hole in the end in which hardened bushings of various sizes are fitted to slip over the arbor and to

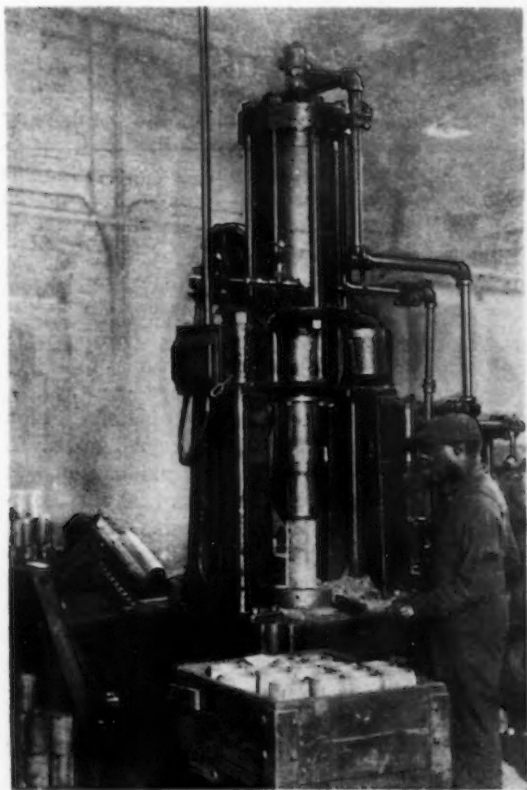


Fig. 1 (Above)—Rough castings used for pulley hubs are forced through hardened steel rings having a cutting edge on the upper surfaces.

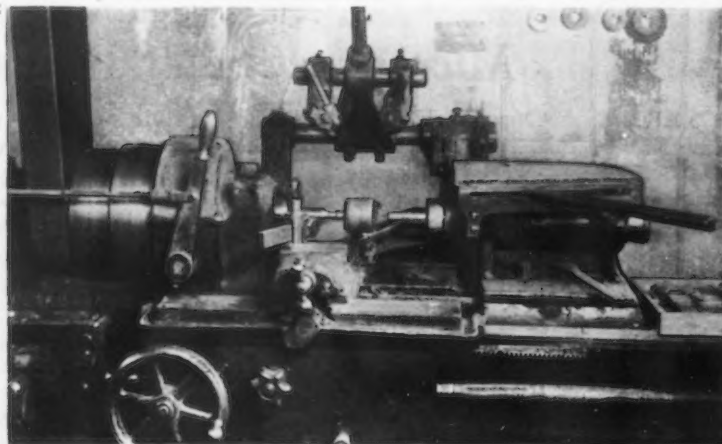


Fig. 3 (Above)—A special tailstock has been constructed for a Chard lathe, the sliding sleeve being operated by a self-locking toggle lever.

Fig. 2 (At Right)—Bores of large sizes of pulley hubs are broached on a vertical hydraulic broaching machine operated by a Hele-Shaw pump coupled direct to a 25 hp. motor.



push the pulley against the shoulder on the arbor. The rounding crown of the paper pulley is obtained by means of the radius rod shown directly under the pulley. Any radius from 8 to 30 in. can be secured by sliding the pivot bolt in the T-slot.

One of the most unusual machines in the shop is a special drilling machine, Fig. 4, which was designed and built in the Rockwood company's plant. It is driven by a 25-hp. motor and drills 16 1-in. holes at the rate of 1 in. a second. The feed is obtained by a cam which lifts the table seven times a minute. An automatic centering device is a part of the machine and a stock ejector kicks the drilled fiber blocks out of the way as the table reaches the bottom of the stroke. The multiple drill heads for the machine are of ball-bearing construction, many of them being adjustable radially. As the larger drill heads weigh about 700 lb. each, special equipment had to be provided for handling them. Overhead tracks lead to a common center under which is a swinging table, so that one man easily can drop the drill head on the table by means of the toggle device at the lower end of the suspension rods. The table then is swung under the spindle sleeve, the lower end of which has a flange 12 in. in diameter.

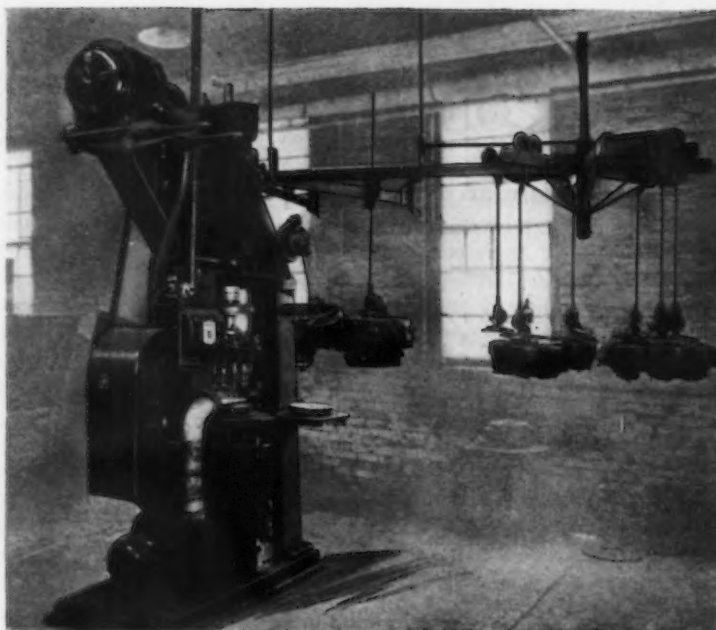


Fig. 4—A specially designed drilling machine drills 16 1-in. holes at rate of 1-in. per second. Drill heads are handled as shown

Microstructure of Tungsten Carbide Tools

BEFORE the New York meeting of the Institute of Metals, Feb. 20, J. L. Gregg and C. W. Kuttner, metallographists Western Electric Co., Chicago, read a paper on "A Metallographic Study of Tungsten Carbide Alloys." The following five of these new alloys were investigated with microscope and X-ray spectrometer:

Name	Form	Chemical Analysis			
		Carbon	Tungsten	Cobalt	Iron
Thoran	Tool	3.94	95.85	none	..
Diamonite	Tool	3.91	95.65	none	..
Elmarid	Die	5.9	83.0	4.5	0.4
Walramite	Die		not analyzed		
Widia	Die	5.68	87.40	6.10	..

Diffraction patterns showed that Widia contains only one tungsten carbide, WC, whereas the others contain both W_2C and WC.

For microscopic examination the samples were first ground on a medium coarse carborundum wheel, then with emery flour on a bare metal wheel, then with levigated alumina on the same bare wheel, and finally alumina on felt. (Dr. S. L. Hoyt, research laboratory General Electric Co., Schenectady, N. Y., said that the surface, after carborundum grinding, can be rapidly smoothed with boron carbide powder on a lap; diamond dust then will prepare the surface for high power photomicrographs.)

Etching reagents used are a mixture of nitric and hydrofluoric acid, which attacks W_2C at room temperature. WC is darkened by alkaline ferricyanide, while W_2C is unattacked.

Both Thoran and Diamonite consist of a network of WC surrounding what appears to be a eutectoid of W_2C and WC. Microstructure of Elmarid is similar, although the network appears to contain both W_2C and WC, and some WC appears in straight traces across the grains. Walramite has a much finer structure, and the hardness of matrix and network is about the same. There are many black spots in these alloys, either cavities or places where brittle fragments have broken out.

The cavities in a section cut from Widia are very much smaller. No reagent has been found which develops any contrast on the surface; the authors surmise that it consists of fine grains of WC bound together by some unknown constituent.

In comment, Doctor Hoyt said that the alloys, showing eutectoid or eutectic structures, were doubtless cast materials. Widia is sintered. Another similar material, unnamed by him but possibly Carboloy, he said is composed of WC grains 0.001 mm. in diameter, and exhibits a uniform and homogeneous microstructure.

German Apparatus Determines Ignition Point of Coke

An apparatus for the determination of the ignition point of coke and other solid fuels is described by H. H. Greger in *Brennstoff-Chemie*, a German publication. It consists of a glass tube, with a diameter of 20 mm., containing the sample ground to 10 to 20 mesh. The tube is immersed in an iron crucible full of sand in such a manner that a current of air, one litre per minute, can be drawn down through the heated sand in the crucible and up through a short column of sand within the tube, and finally through the sample of fuel. In this manner the temperature of the sample can be raised rapidly and regularly by internal heat. The ignition point is indicated by a sudden acceleration in the rise of temperature by a thermometer, the bulb of which is immersed in the fuel sample. The ignition points, as determined, vary from 296 deg. C. for a wood charcoal to 690 deg. C. for a metallurgical coke.

Tariff and Other Steel Data for All Countries

"Statistics of the Iron and Steel Industry for 1927," as published annually by the National Federation of Iron and Steel Manufacturers, London, England, is just off the press. It contains 162 pages of valuable iron and steel statistics of output, exports, and other information of 22 countries. A new section has been added this year which contains data dealing with tariffs on iron and steel products in various countries. Copies may be obtained by addressing M. S. Birkett, secretary of the Federation.

Operating Speeds for Differential Hoists

How Much a Man Can Pull and How Fast He Can Pull It—
Big Men vs. Little Men—Rest Periods Required

BY A. M. HARRINGTON*

ALL of the data on the subject of hoisting speeds, and the number of men necessary to operate hoists of different capacities, have been so vague as to be misleading. We have therefore refrained from publishing such data since 1907. A recent demand for the information, with suggestion of a new way for giving it in reliable form, has resulted in extensive tests to obtain the necessary data.

Previous information on this subject specified only the number of feet a minute at which different full loads could be lifted, without having the operator exert over 80 lb. of effort. This ignored entirely the fact that speed is greater for light loads, which require proportionately less pulling effort upon the hand chain. The old data also omitted any way of determining speed of hoisting when

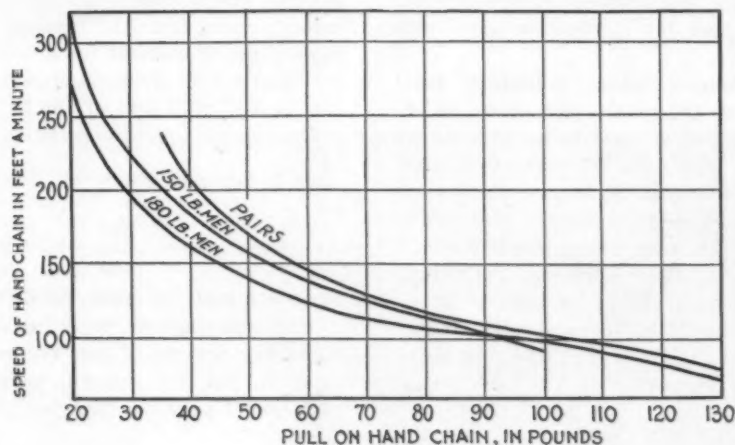
it was necessary for one man to operate a large-capacity chain hoist, requiring more than 80 lb. pulling effort.

In our recent tests we worked basically from the pull which it was necessary for the operator to exert. This was measured by actual weights, just enough to move the load, attached to the hand chain of a 2-ton Harrington Peerless hoist. The amount of load on the hoist was varied, resulting in proportional variations of effort required on the hand chain. The differences were small enough to give a series of results which could be plotted in the form of curves, from which intermediate values could be read.

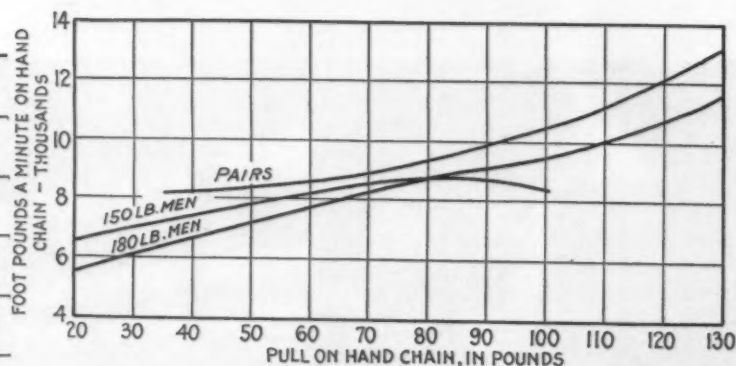
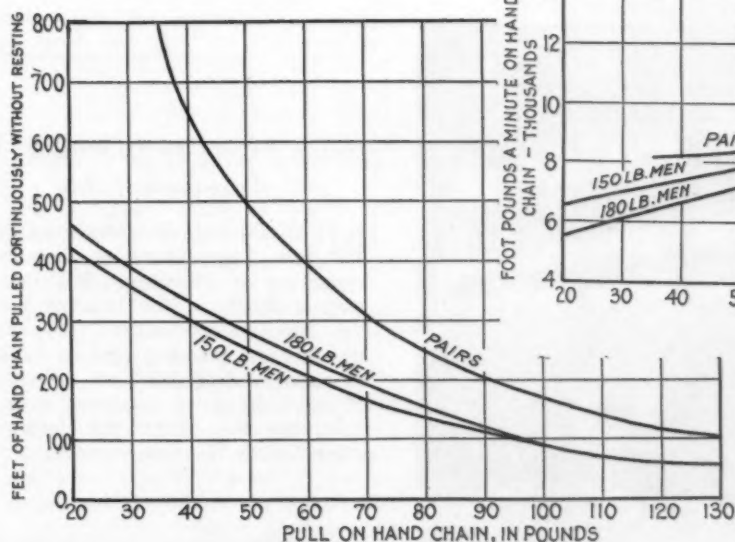
At the start of the test it was explained to the men that each single man or pair was to operate the hoist, with each of the different loads, for a length of time determined only by his own physical condition, and at any speed or rhythm of body movement that he particularly

*Treasurer Harrington Co., maker of chain and electric hoists, etc., Seventeenth and Callowhill Streets, Philadelphia.

SPEED of Operation Is Shown in Fig. 1 (Right) as Affected by Weight of Men at Work and the Amount of Pull They Exerted on the Hand Chain



SMALL Men Put in More Energy Than Big Men at Low Values of Pull (Fig. 3, Below) Because They Work Faster, But They Fall Behind at Heavier Pulls



ENDURANCE of the Operators (Fig. 2, at Left) Is Shown as a Function of the Pulling Force Exerted Without Resting

preferred. It was stressed that they should avoid competition. It was suggested that their mental attitude should be that of workers who had a hoisting operation to perform a number of times each day as part of other work, such as lifting a load on to a high machine, it being immaterial whether they lifted quickly or slowly, in one continuous operation or by a series of lifts, with resting periods between.

The hoist used in the test could lift the load 30 ft. It was equipped with a loop of 50 lineal feet of hand chain, with one link distinctly marked, so that stop-watch readings could be taken for each cycle of 50 ft. The entire test involved 23,550 ft. of hand-chain operation, 153 min. actual pulling time, and 1,268,000 ft.-lb. of work applied in operation on the hoist.

Eleven operators were divided into three squads, according to weight. Three large men, averaging 180 lb., formed the first squad; six medium men, averaging 150 lb., formed the second squad; eight men, working in pairs, formed the third squad. After making all the tests the results were averaged for the several men in each squad and plotted in curves.

Two of the curves, speed of operation, and endurance of operators, are of principal importance. The first of these, speed of operation (Fig. 1), shows pulls upon the hand chain from 20 lb. to 130 lb., with speeds from 70 to 300 ft. a minute.

It will be seen, from the three curves on this plate, that the large men (180-lb. class) could exert pulls up to 130 lb., but that their speeds were slower, for pulls below 90 lb., than the men in the 150-lb. class. For the medium weight men operating singly, 100 lb. pull is the maximum for the operation of 50 ft. of hand chain. Men working in pairs show only slightly more speed at the heavier pulls than the large single men, but increase in speed with lighter loads.

Observations for endurance before voluntary rests were plotted in Fig. 2, where the results are shown as the feet of hand chain operated at various loads between 20 and 130 lb. hand-chain pull. From the three curves plotted, it will be seen that the endurance of large men is only slightly greater than that of medium-weight men, while pairs continue at the job much longer than single men.

The endurance was equal for medium-weight single men at 35 lb. pull, and for pairs at 70 lb. pull, or 35 lb. each, but, as the pulls decreased, the pairs showed greater endurance, probably owing to the fact that, the pull being light, each one waited for the other to give the signal to quit.

Energy input (Fig. 3) shows the relative ability of the three classes for hoist operation. The foot-pounds a minute of pull on the hand chain is plotted for various loads. This is instructive chiefly in showing that large men produce less energy for light loads than men of medium weight.

To use these data to find the actual hoisting speed for any load it is necessary to refer to the catalog, which gives the pull on the hand chain for the full load on each capacity of hoist, and also the feet of hand chain handled to lift one foot of load, also known technically as the velocity ratio.

Actual pull on the hand chain for a load less than the full rating of the hoist will be in direct proportion to the full-load pull in the catalog. As an example, the net pull for lifting a 5000-lb. load, for which it would be wise to choose a hoist of 3 tons capacity, cataloged to require

127 lb. pull to lift full load, would be $\frac{5000}{6000} \times 127 = 106$ lb.

Referring to speed curves on Fig. 1, it will be seen that this is beyond the ability of average 150-lb. men, and that a large and strong man could attain about 95 ft. of hand chain a minute, or a pair of men 100 ft. a minute. Now, from the catalog data, the velocity ratio for a 3-ton Peerless hoist is 59 to 1, so that the load travel would be

$\frac{95}{59} = 1.6$ ft. a minute for a single, strong operator, or $\frac{100}{59} = 1.7$ ft. for a pair of operators.

If the load were to be lifted a considerable distance, say 6 ft., it would then be wise to consult the endurance curve. This shows that at 106 lb. pull a single man can overhaul approximately 80 ft. of hand chain without fatigue, and a pair of operators 150 ft. Again using the velocity ratio from the catalog, we find that the necessary hand chain movement for a 6-ft. lift is $6 \times 59 = 354$ ft.

This is too much hand chain to be moved without a rest period, at a pull of 106 lb., the hand chain movement for the single operator being divided into five periods with

rests in between, found by dividing $\frac{344}{80}$. In a case of two

operators, where $\frac{344}{150} = 2.3$, it would probably require

three attempts to make the 6-ft. lift.

No observations were made for the length of any voluntary periods of rest before continuing with a second attempt, but, for general purposes, we would assume a rest period equal to that for the actual hoisting.



Hauls Ingots to Blooming Mill Approach Table

NEW Baldwin-Westinghouse Electric Ingot-Transfer Locomotive operating in Blooming Mill of Aliquippa Works of the Jones & Laughlin Steel Corporation. It carries ingots from soaking pits to rolls, an average haul of 325 feet. Some idea of the high speed acceleration is had from the fact that the locomotive often makes 75 trips an hour.

Grinds Shafts 28-Ft. Long

Machine Having 61-Ft. Bed Is Designed for Both Long and Short Work

DUPLEX table arrangement is the special feature of the 24 x 36-in. x 28-ft. self-contained heavy-duty grinder illustrated, which has been placed on the market by Cincinnati Grinders, Incorporated.

The machine was designed primarily for a shop that has need for the 28-ft. length capacity only about 300 hours a year, most of its work requiring capacity not exceeding 14 ft. between centers. This condition, calling for a machine that would be equally efficient on large and small work, was met by providing a machine with a 61-ft. bed and a duplex table.

This design permits the tables to be uncoupled and the short table to be positioned at one end of the bed. The work headstock or the tailstock,

ranged for Alemite-Zerk lubrication.

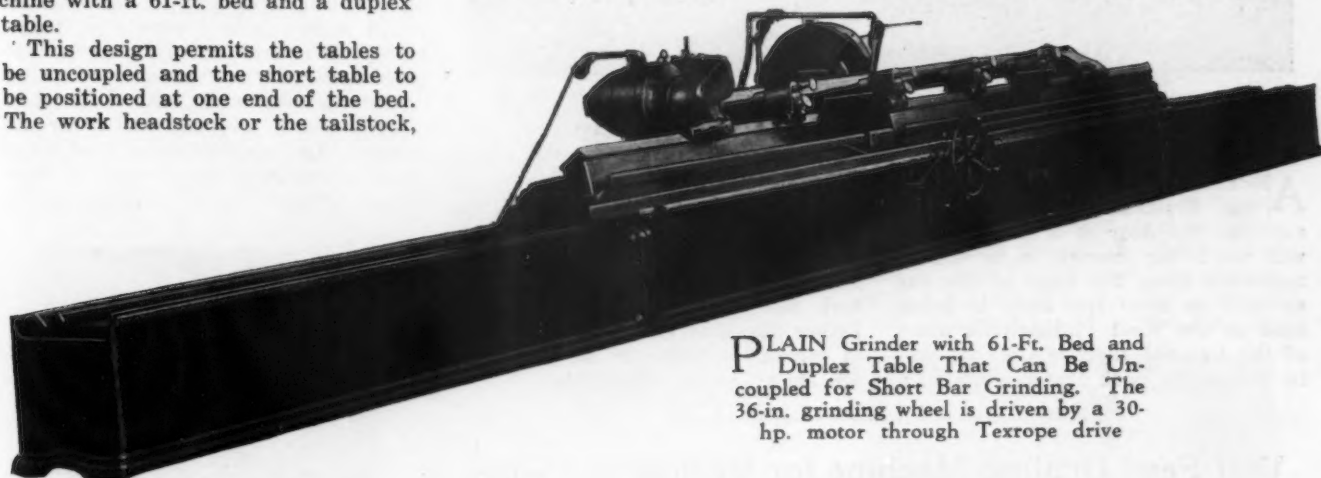
The base of the machine is subdivided into two units, front and rear. The front base, of massive design is made in three sections to facilitate transportation. The top of the base has a vee and a flat bearing surface for the sliding table, the vee being located close to the grinding wheel. The rear base forms a housing for the jackshaft, the 35-gal. per min. centrifugal coolant pump, part of the cross-feed mechanism and the rapid traverse unit.

A ½-hp. a.c. motor drives the

work up to 14 ft. long to be ground without throwing the headstock or footstock centers out of alignment. The sliding table receives its motion through rack and pinion and worm, and a tarry clutch functions at each reversal of the table to eliminate shocks and decrease stresses in the pinion. Hand traverse of the table is also provided.

Hydraulic Scrap Press with Deeper Baling Box

THE Galland-Henning Mfg. Co., Milwaukee, has placed on the market a new hydraulic baling press to meet the demands of automobile companies whose scrap frequently con-



PLAIN Grinder with 61-Ft. Bed and Duplex Table That Can Be Uncoupled for Short Bar Grinding. The 36-in. grinding wheel is driven by a 30-hp. motor through Texrope drive

as the case may be, is then transferred to the table in use. The duplex table feature is said to be made practical by the continuous forced-feed system employed for oiling of the table ways, which provides adequate lubrication on both long and short-stroke work. Both tables may be used continuously or intermittently without loss of accuracy due to localized wear of the ways.

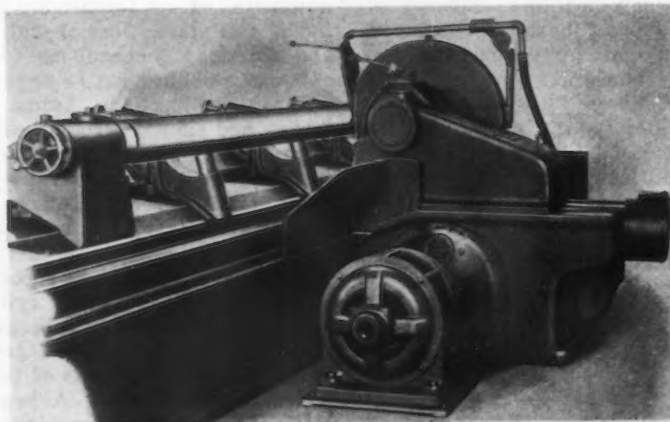
In general appearance the machine resembles the company's 14 and 16-in. plain cylindrical grinders. Unit construction is followed throughout and all control levers are within easy reach from the operator's position. The main drive is by a 30-hp. a.c. motor, which is accessibly located at the side of the machine and connected to the ball-bearing jackshaft by a flexible coupling. The drive from the jackshaft to the grinding wheel spindle is by Texrope.

The grinding wheel is 36 in. in diameter and has a 4-in. face. The ball-bearing wheel spindle mounting involves the principle of an initially imposed load to assure positive contact of all balls with their respective races, thus preventing any radial or axial play. Moreover, the load is applied in such a manner that the spindle expansion would relieve rather than increase it. The intermediate ball bearing is self adjusting through a force of approximately 800 lb. produced by helical springs. In this manner compensation for wear is automatic. The spindle is ar-

wheelhead power rapid mechanism. Control is by a single lever and both the power and the hand feed are disengaged automatically when not in use. The headstock is driven by a 3-hp. d.c. variable-speed motor through Texrope drive and worm gearing that runs in oil. Back gears provide additional means for varying the work speed. Current is supplied to the motor through a cable that is carried on an automatic winding drum. If direct current is not available it may be supplied by means of a generator which may be mounted from the rear of the base and driven from the main motor.

The swivel tables, which are of angular type and are clamped to each end of the sliding table, permit taper

sists of large bulky pieces of sheet steel. The automotive industries, it is stated, desire a deep box press, and with this in mind the Galland-Henning company has added to its line a press which has a box 20 in. wide, 44 in. deep and 100 in. long. This size of box was decided upon after investigation of the sizes of scrap characteristic of automobile body manufacturers. The greatest amount of scrap produced by these companies comes from door trimmings, which are cut from 44 in. stock, leaving scrap 39 to 41 in. wide. By making the box 44 in. deep the Galland-Henning company believes it has eliminated the extra expense caused by the tamping and stacking that is required in shallower presses.





Unloading Sheet Steel from Box Car

A SPECIAL crane hook which, as the illustration shows, can be run into the door of a box car, and will reach far enough in to unload materials from the ends of the car as well as near the door, is being used in the West Philadelphia plant of the General Electric Co. As will be noted, the hook frame contains a

heavy counterweight at one end for balancing purposes. The load is picked up at a point directly under the hoist of the crane itself, so that the raising of the load does not disturb the balance of the apparatus. Either chains or magnet may be used in connection with the device. Both are shown in the illustration.

Dial Feed Drilling Machine for Variety of Pieces

FOR rapidly drilling, burring or countersinking parts that can be fed by a dial plate and clamped during the machining operation, the Kent Machine Co., Cuyahoga Falls, Ohio, is offering the new dial feed drilling machine illustrated. Operation is continuous and is entirely

automatic, except for placing the part in the dial plate. Special dial feeding and clamping mechanisms for work of various shapes can be applied.

When drilling the heads of cap screws and similar pieces, the dial carries the part to a position under the spindle, where it is centralized by a pair of jaws. One of these jaws is fixed but can be adjusted for various sizes; the other jaw is movable and is cam actuated. For drilling at right angles to the center line of a cylindrical piece, the dial plate can be provided with radial slots and the jaws arranged to clamp the ends of the piece before drilling begins. A bracket is provided to carry a guide bushing immediately above the part being drilled. Drilled parts are carried around by the dial plate to the discharge chute.

To take advantage of all speeds and feeds for parts of different designs and materials, the camshaft which controls the timing operations can be regulated so that full capacity of the drill and the machine may be obtained. Practically any predetermined speed and feed of drill can be secured in design, and as the dial feeding interval is very short, production is rapid.

The maximum drilling capacity of the machine in steel is $\frac{3}{8}$ in. in diameter, $\frac{1}{4}$ in. deep. Either cone belt drive or a 2-hp. 1200-r. p. m. constant-speed motor drive can be furnished and the machine can be supplied



Special Dial Feeding and Clamping Mechanisms Adapt the Machine for Drilling a Wide Variety of Pieces

either for pedestal or bench mounting. The weight of the floor type machine is 1350 lb., and the floor space occupied is 24 x 44 in.

New Bronze Welding Rod

BRONZE welding rods have been widely used for making joints in cast iron, copper, brasses and bronzes and steel, both plain and galvanized. Conventional materials for such rods are 60:40 brasses to which approximately 2 per cent of tin has been added. Disadvantages connected with such rods are that the melted metal is liable to boil if overheated, and that annoying zinc oxide fumes are copiously emitted.

To avoid these defects, Oxweld Acetylene Co. of New York have developed a new alloy, known as "high strength bronze No. 21." It is also said to have a uniformly low melting point and is easily controlled while liquid, yet is as hard and wear resistant after application as weld metal from manganese bronze rod. Weld metal from the new rod is also re-



Galvanized 6-in. Steel Pipe Welded with New Bronze Rod

ported to be tough and ductile, having a tensile strength of at least 45,000 lb. per sq. in., or approximately 15,000 lb. per sq. in. higher than previously available weld metal. A strong bond is also made between bronze and cast iron or steel at welding temperatures, much below the melting point of the latter.

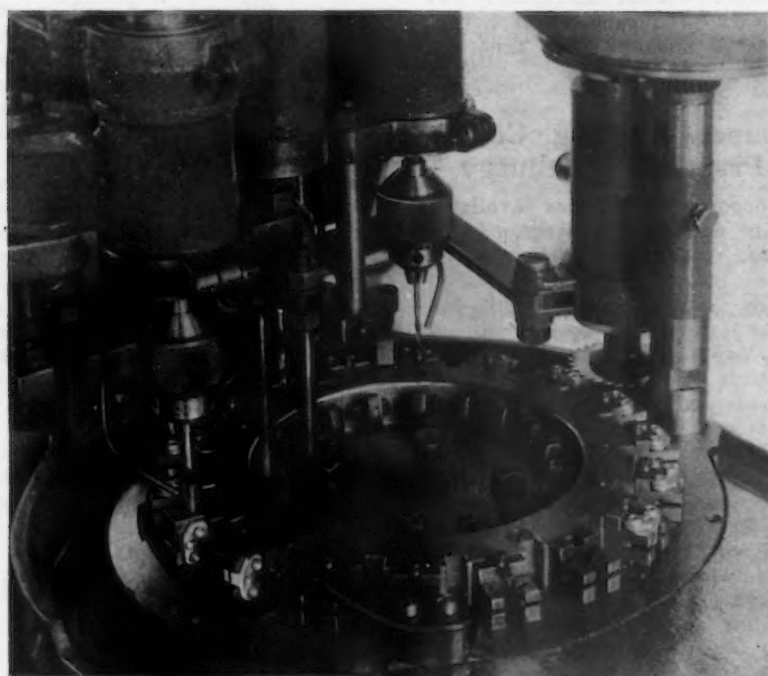
To Assemble Wright-Gypsy Engines in St. Louis

THE Wright Aeronautical Corporation, Paterson, N. J., intends to establish a plant in St. Louis for the production of its Gypsy engine, a four-in-line, air-cooled motor for installation in light airplanes. The plant is expected to be in operation by July 1, and \$50,000 will be expended for machinery to assemble 200 engines a month. Several St. Louis firms will be asked to bid on the manufacture of parts for the engine. W. K. Swigert, former production manager of the Stutz Motors Co., has been appointed manager of the St. Louis plant.

Dial Feed Tapper with Slotting Feature

THE range of operations of the dial feed tapping machine manufactured by the Anderson Die Machine Co., Bridgeport, Conn., has been further increased by the recent addition of a spindle for slotting and milling operations.

This milling spindle is pivoted outside of the feeding dial proper, and is actuated by means of a cam which is placed on the vertical main driving



The Slotting or Milling Spindle Is Pivoted Outside the Feeding Dial Proper. The small casting above is slotted and tapped as shown

shaft so that it will synchronize with the other elements of the machine. Operations on the particular piece illustrated consist first of slotting, then tapping three holes at right angles to the slot. The fixture is then indexed and the hole into which

the slot is cut is tapped with a 10/32 tap. Arrangement of the machine, together with data relating to tapping, inserting and staking screws in contact blades for separable plug caps, was described at length in *THE IRON AGE* of Aug. 25, 1927.

Ball-Bearing Swing Frame Grinder

SIMPLICITY and ruggedness are features claimed for the swing frame grinder illustrated, which was demonstrated by the Kinney Iron Works, Los Angeles, at the Western States Metal and Machinery Exposition, held in Los Angeles, Jan. 14 to 18. The machine is adapted for snagging iron and steel castings, grinding billets, rails and frogs, and for dressing oil tools.

Neither belts nor gears are used in the drive, which comprises either

a 5 or a 10-hp. motor direct-connected by flexible coupling to a 2 7/16-in. grinding wheel shaft. Both ends of this wheel shaft are carried in self-aligning double-row ball bearings in dust-proof housings. The motor is fan cooled and is equipped with dust proof ball bearings.

With a 5-hp. motor drive the maximum grinding wheel size is 18 in. by 3 in.; with a 10-hp. motor wheels up to 24 in. by 3 in. can be used. The wheel operates at a right



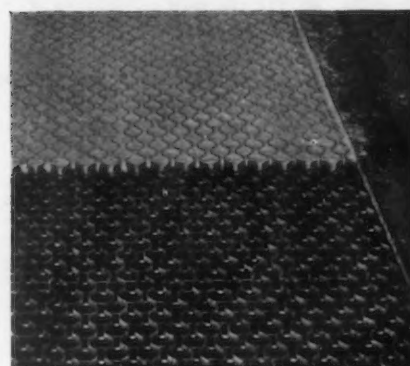
The Grinding Wheel Shaft Is Direct - Connected to the Motor by Flexible Coupling

angle to the frame, which permits the operator to see the work at all times, and minimizes danger from flying fragments of broken wheels. The wheel guard may be rotated to expose either side of the wheel. The machine may be hung from a chain block and is suspended by a sliding collar, which permits maintaining proper balance as the wheel wears. Wheels may be changed quickly. The length of the machine, without handles, is 7 ft. 9 in.

Wear-Proofing the Surface of Factory Floors

RAPIDLY increasing traffic in plants, carrying of heavy loads on small-wheel trucks, dropping of boxes, castings and other heavy pieces soon breaks down the surface of concrete floors. To remedy this condition the Blaw-Knox Co., Pittsburgh, has placed on the market a material for steel-armoring concrete, asphalt and composition floors so that the surface will be as strong as any part of the floor.

Known as Floorgard, the material is a built-up continuous steel mat laid down to form the surface of the floor. The pattern is designed to present such a surface to traffic that stresses will be taken care of by the steel it-



self, distributing loads throughout a wide area of floor. That portion of the concrete appearing between the steel bars is in no way divided up into separate portions, but is "monolithic" with the rest of the concrete forming the floor body.

The material consists of steel strips shaped into a regular pattern, which, when placed together, form a series of separate rectangles of proper size to meet the conditions under which a given floor must work. These steel strips are set on edge, as shown. Small tie rods are inserted horizontally through holes in the middle of the strips. These tie rods act as carrying members, carrying one strip to another strip, as well as tying the entire surface into one steel mat.

Small steel lugs between adjacent strips of Floorgard, at the points where the tie rods go through the strips, act as anchors to keep the strips in the plastic material. They act also as separators between the strips, avoiding any possibility of rust due to contact of steel. There are no acute angles to cause the formation of thin, easily broken fins of concrete.

Practices to Be Discussed at Concrete Steel Meeting

WASHINGTON, March 5.—The Federal Trade Commission has announced that among practices proposed for discussion at the trade practice conference for the concrete reinforcing steel industry are the following:

Entering into contracts for large quantities of reinforcing steel bars without actual obligation of the buyer to purchase any particular quantity or quantities, or for any particular jobs, for the purpose of securing to the buyer a discriminatory price.

Splitting of fees, commissions, and other payments with engineers, architects and other persons, without the knowledge and consent of all parties to the contract.

Willful interference with existing bona-fide contracts.

Dumping surplus stocks in territory outside of distributors' regular markets, at discriminatory prices.

Failure of the distributors to adhere to their own published prices and submission of more than a single bid price on any one job, even though no changes in specifications have been made.

Secret rebates, commercial bribery and departure from terms of discount.

Misbranding and misrepresentations in connection with the sale of bars.

As stated in THE IRON AGE of Feb. 21, page 553, the conference will be held on April 18, at Kenilworth Inn, Asheville, N. C. It will be presided over by Commissioner G. S. Ferguson, Jr., and not by the chairman, as previously stated by the commission. Applicants for the conference, comprising the Concrete Reinforcing Steel Institute, represent about 80 per cent of the concrete reinforcing industry, according to the commission.

Use of Tin-Foil Doubled in Past Few Years

More and more tin-foil is being used every year, for new uses for it are being constantly discovered, according to a statement published by Doremus & Co., 44 Broad Street, New York. The importance to the tin industry of the little bits of tin-foil thrown away carelessly each day is strikingly emphasized. Radio condensers, for instance, require it in a very accurate gage of sheet which is so thin that 4350 sheets in book form are only 1 in. thick. The finished sheets are no more than 0.00022 in. in thickness and 18,500 sq. in. are made from a pound of tin.

Tin-foil is even used in large guns, says the statement. It is introduced into the gun before firing, a very small quantity being added to the charge to diminish the deposit of copper on the rifled bore. The thinness of the tin-foil permits the division of the metal into sufficiently fine particles to facilitate the interaction between the copper and the steel.

In 1925 the United States alone consumed 2993 gross tons of primary tin in the manufacture of silver paper, and in 1927 this figure had expanded to 4193 tons. This extra demand was largely due to the growth in the con-

sumption of cigarettes from 80,000 millions to 97,000 millions, to the increase in the sale of sweets, and to the packing of cheese in segments.

Two More Open-Hearth Furnaces Built in 1928

The Columbia Steel Corporation, San Francisco, in 1928 built two 65-ton basic open-hearth furnaces at its Pittsburg, Cal., plant. This brings the total number of open-hearth furnaces added to American capacity last year to 12. The capacity of the 12 furnaces is about 895,000 tons per year.

Announce Evening Course in Practical Metallurgy

An opportunity is now available for plant managers, superintendents, draftsmen, inspectors, designers and foremen in the Hartford region to study practical metallurgy. A 17-weeks course has been arranged by the Manufacturers Association of Connecticut, Inc., sessions to be held at the association's headquarters, 50 Lewis Street, Hartford. The first one was held Monday evening, March 4. The first two sessions are free and without obligation to those interested. The courses will include studies of the following principles and methods:

General scientific principles, ores, refractories, non-ferrous metals, iron ores, blast furnace, Bessemer steel melting, open-hearth, comparison of methods of steel melting, mechanical treatment of steel, founding, binary alloys, physical constituents of iron and steel, alloy steels, annealing, hardening, tempering, heat treatment, etc.

E. L. Wood, of Landers, Frary & Clark, an active member of the Hartford chapter of the American Society for Steel Treating, will direct the teaching of the course. A nominal charge of \$25 covers the text book, 17 lessons and one laboratory period.

Iron Ore Imports in Smaller Volume

WASHINGTON, March 1.—Imports of iron ore in January declined to 180,308 gross tons, from 204,799 tons in December and 251,178 tons in January of last year. Chile led by far as the source of shipments during all three periods, furnishing 83,451 tons in January. Cuba supplied 39,000 tons and French Africa 25,100 tons.

Only five months since 1925 have shown a smaller incoming tonnage of iron ore.

SOURCES OF AMERICAN IMPORTS OF IRON ORE

	(In Gross Tons)		
	January, 1929	December, 1928	January, 1928
Spain	11,388	255	....
Sweden	6,648	....	....
Canada	122	350	2,358
Cuba	39,000	48,000	14,000
Chile	83,451	113,960	150,800
French Africa	25,100	42,230	63,675
Other countries	14,599	4	20,345
Total	180,308	204,799	251,178

Detroit Company to Market New Line of Alloy Steels

A new line of alloy tool steels is being introduced to the national market by the Detroit Alloy Steel Co., foot of Iron Street, Detroit, a new company which is headed by Hugh Martin, who is also president of the Detroit Gray Iron Foundry Co. Louis W. Schimmel is vice-president and Harry H. Wyatt is secretary-treasurer. The new steel will have the trade name "Dasco."

These steels, it is stated, comprise a number of different alloy combinations applicable to a wide variety of uses in the automotive, railroad, steel, bakelite, cement, wire and other industries. They will be supplied in the form of castings and bars in almost any required sizes.

Through air hardening to 1650 deg. Fahr., a maximum hardness is said to be obtainable without quenching. Dies made of Dasco steel, it is claimed, have shown unusual wearing qualities. They are said to be easily machinable and take a high polish. Dies of Dasco steel may be cast in one piece to intricate shapes, saving material and machining costs.

Sales branches with complete stock will soon be established in the more important industrial centers, and the company will specialize in quick deliveries.

American Electrochemists at Toronto in May

At the spring meeting of the American Electrochemical Society at Toronto, Canada, May 27 to 29, Prof. Harry A. Curtis of Yale University will deliver a lecture Tuesday evening, May 28, on "Nitrogen Fixation Factories of the World." Professor Curtis is considered an expert in this field.

A joint session of the society with the Toronto branch of the American Electroplaters' Society will be held Wednesday morning, May 29. On the afternoon of the same day there is scheduled a joint session with the Canadian Chemical Association.

The main scientific session of the convention will be devoted to papers on electromagnetic characteristics of electrochemical processes. Six papers have been arranged for this meeting and they cover phenomena experienced not only in solids and solutions, but also in gases. Floyd T. Taylor, Matawan, N. J., will be in charge of this session. One session will be devoted to a discussion of modern methods of teaching electrochemistry, in charge of Prof. Roy L. Dorrance, Queens University, Ontario.

Rail Detector Tests 2000 Miles of Track

Use of Device at Mills and Application of Principle for Testing
Other Forms of Steel Suggested

BY C. W. GENNET, JR.*

STATISTICS of the Rail Committee of the American Railway Association for the year 1927 showed that 4596 fissures had occurred that year on 170,000 miles of track, which is at the rate of 7500 for that year in the United States. An important road has reported finding a fissure every 15 hr. for a year. Five hundred and fifty-three actual train accidents were ascribed to broken rails in 1927, and the probability is that the killing of four persons and the injuring of 172 were all the direct result of fissures. The hastiest review shows that in the 17 years following the Lehigh Valley accident (in 1911), at least 59 persons have been killed and 405 injured by fissures, the last bad accident occurring in 1925 on the St. Louis-San Francisco and reliably reported to have cost approximately \$750,000.

The theory of the detector car (invented by Dr. Elmer A. Sperry) is fairly simple. It appears that electricity flowing through a wire, or a rail, is similar to water flowing through a pipe. As long as there is no interior obstruction in the pipe, the water flow is steady and normal, but the imposition of some interior impediment causes various eddies to be set up and the flow becomes abnormal. So in a wire, or rail, an interruption to the straightforward flow of the electric current due to a flaw, or fissure, creates certain impulses at the point of origin. With sufficient amplification these impulses can be multiplied and made noticeably large. Thus, as Doctor Sperry says, "the skeleton is dragged from the closet," and the defect marked.

As in the case of many simple theories, the application of this one to the testing of rails in track leads to a machine somewhat complicated and delicate. A gasoline motor direct-connected with a generator supplies the direct current used for energizing the rails. Brushes, held down by air pressure, bear on the rail, the incoming and outgoing brushes being about 3 ft. apart, so that such a length of rail is energized on each side of the track. Between the two brushes is the detector. Wires leading from the detector carry the minute impulses to an amplification set, and later through relays to a recording unit which furnishes a paper record of the track traveled. In the circuit, with the re-

coding unit, there is a paint gun so that daubs of paint are instantly applied to the rails whose defects have actuated the circuit. The detector car is propelled by another substantial motor car capable of maintaining a uniform operating speed of 6 or 7 miles an hour.

Two Detector Cars Now in Use

No doubt more interest is attached to the results obtained than to the actual construction of the detecting equipment, accounts of which have already been widely published. To give some definite results, even if such were possible, would be a good deal like a banker discussing freely the account of one of his depositors. Time will probably tell its own story and it seems sufficient now to say with great emphasis that the detector car works most successfully and satisfactorily.

The equipment owned by the American Railway Association and being operated by the Rail Committee has covered practically a thousand miles of track on eight or nine different roads. The equipment with which I am concerned has tested nearly as much more. Both cars have repeatedly located fissures of various sizes in rails where no external manifestation of any kind would enable one to predict the presence of such serious defects; in fact, nearly every day produces some kind of example illustrating again and again the miraculous achievement of the detector car by performing what, but a short time ago, was considered absolutely impossible. Various changes of detail are constantly being made and as time goes on improvement in method and in operation is bound to result in the further perfecting of what is one of the great contributions to the safe operation of railroads.

Detector Discloses All Flaws

A moment's reflection of the simple theory on which the car is based makes it evident that everything in the rail being tested that causes an impulse in the detector must be recorded. Thus, surface flaws, spike maul dents, and burned spots caused by slipping wheels are easily picked up, while split heads, pipes, horizontal and compound fissures also are recorded the same as are the more wicked transverse fissures. At first, and in the great enthusiasm to "get" fissures, some might construe this apparent lack of discrimination as a drawback; but, indisputably, the es-

tablishment of facts bearing on the integrity of the rails of the track cannot be underestimated, and the proper interpretation of each indication on the record can be easily made. A careful surface inspection of the rails should be made, therefore, concurrently with the operation of the detector car, and if no external flaw or defect is visible, it may be assumed then beyond peradventure that the trouble is of internal origin, and such action may be taken as seems warranted.

The detector car operator should be a party to this inspection for, even if operations are somewhat retarded, he can, if necessary, make additional tests to determine the character of the internal defect and, in the case of transverse fissures, estimate their size with remarkable accuracy. Thus the record of the track tested can be made of far-reaching importance, unequalled even by the recognized skill of trackmen. Some questions involving the rate of the growth or development of fissures must remain unanswered until time, experience and experiment have determined the best procedure to follow. After all, the testing of rails in track is a good deal like a doctor's examination of one's condition; no particular trouble is anticipated, but very serious trouble may be easily averted by systematic attention to the teeth, the blood pressure, or the kidneys.

Principle of Detector Applicable for Tests of Other Forms of Steel

It must be obvious that the principle of the Sperry invention can be applied to the testing of various other forms of steel than rails in track. Many parts of automobiles, car axles, locomotive forgings and pipe offer attractive fields for application of the method; for concealed defects of one kind and another frequently develop in those parts, especially when heat treated or welded. The ability of the detector, under an adjustment of fine sensitivity, to pick up all forms of defects, both internal and external, renders it of peculiar value for testing in many ways; and if it should be considered essential to test newly rolled rails, the arrangements for doing so can be easily consummated. In fact, the desirability of testing new rails by this method is most interesting and attractive, as the experiments now being conducted indicate.

It would be extremely unwise to regard the whole subject of rails as having been lately boiled down to the

*Vice-president Sperry Rail Service Corporation, Chicago. Abstract of paper, entitled "Rails and Rail Failures," read before Western Society of Engineers, March 4.

two questions of top rails and fissures. Compared with any others, those two matters stand foremost today as deserving of the fullest attention from every source. In the case of one, the railroads are put to unwarranted expense, anxiety and risk by the continuance of an indefensible practice; in the case of the other, a constant peril to safe operation can now be very reasonably overcome through the use of the detector car.

Many other details of rails require investigation. The chemical composition deserves study to determine that which is most suitable for various conditions. Methods for taking the samples of the heats for analysis should be laid down; and the physical testing requirements and specifications generally should be revised to conform to the best and latest thought. Moreover, there is the responsibility alluded to above that the manufacturer bears. It involves making the steel and casting it into ingots, the treatment and rolling of those ingots into rails, with their subsequent finishing; and finally, the establishment of stringent safeguards against bad practice from any cause in any department.

Suggests Use of Detector by Mills

Regardless of the question whether fissures are the results of stresses caused by traffic, or have their inception in some kind of mill defect, there remains the generally accepted fact that different heats of steel give widely different results in service. Why one heat should develop 40 or 50 fissured rails while, under identical traffic conditions, another heat, made at the same mill the same day, appears to be free from fissures, must be interpreted as due to some kind of fundamental difference in the steel or rails of the two heats and for which the maker is clearly to blame. Post-mortem examinations by the laboratory have failed repeatedly to yield a reason for this and other peculiar happenings.

But ample opportunity is now open for ante-mortem investigations, for by locating minute interior ruptures with the detector, the laboratory is certainly able to proceed with its work more intelligently than was formerly the case. Helpful means for promoting study along various lines are now at hand. Perhaps, therefore, the invention of the detector car will not only make for safer railroading, but also assist the manufacturers in carrying out their well known desire and obligation to make better rails.

The Federal Steel Corporation, 126 South Artillery Avenue, Detroit, formerly the Marks-Fiske-Zeiger Co., has moved into its new office and warehouse at above address, and now has capacity for carrying approximately 12,000 tons of strips and sheet steel. Additional shipping and shearing equipment and stripping machines have been purchased. Leo H. Marks is manager of sales.

Will Refuse to Sell to Price Cutters

Reading Iron Co. Takes Firm Stand on Maintenance of Resale Prices on Its Puddled Wrought Iron Pipe

THE Reading Iron Co., Reading, Pa., manufacturer of puddled wrought iron pipe, in a letter to distributors has taken a firm stand for the maintenance of resale prices, and announces that its policy hereafter will be to refuse to make further sales to those who cut prices on its product.

The company's letter follows:

"It is a universally recognized fact that price cutting is an economic evil which has proved to be seriously injurious in many lines of industry. It has been conspicuously injurious in the pipe industry. A distributor who makes it a practice to sell well known merchandise at prices which do not yield him a proper profit, is one who in the long run will be a detriment and not a benefit to the manufacturer and likewise to the distributors who conduct their business on business-like principles. Such practices disorganize and demoralize the business not only of the manufacturer, but also of his other distributors. Persistence in such a practice often leaves a manufacturer without adequate means of a proper distribution of his products in the locality where such a price cutter operates. In the final analysis, as a result of such demoralization, the consumer himself is injured.

"The Reading Iron Co., after a full and careful study of this disturbing situation, has reached the definite determination that, to the full extent permitted by law, it will not allow the just popularity which its products have gained to be used by price cutters for their own selfish purposes.

"Accordingly, the Reading Iron Co. hereby announces its policy, effective forthwith, with respect to the resale prices of Reading genuine puddled wrought iron pipe that it will refuse to make further sales to any distributor who shall fail to observe the minimum resale prices suggested by it in the enclosed price card. (No. P-79-RS.).

"In order to make clear our legal right to declare and enforce this policy, we quote on advice of counsel, from a decision of the United States Supreme Court which decided that a manufacturer 'may withhold his goods from those who will not sell them at the prices which he fixes for their resale.'

"We call your particular attention to the fact that the law does not permit us to accept from you any assurances or promises that you will conform with the suggested minimum resale prices, this notice being merely a notification of our determination to enforce the policy herein stated."

Says Public Puts Cash Value on Trained Intelligence

Trained intelligence was placed on a par with buildings and machinery as a tangible asset of growing importance to American industry by Julius H. Barnes, former president of the Chamber of Commerce of the United States, in an address delivered at New York recently before the trust company division of the American Bankers' Association.

The possibility that the buying public is placing a cash value on intelligent leadership, as distinguished from tangible capital assets, was advanced in explanation of the rise in security prices.

"New agencies of accelerated production and earning power assist one another," said Mr. Barnes. "The modern device of the wireless transoceanic telephone puts the brains of America in instant contact and discussion with a directed organization in Europe, and thus in a flash the trained intelligence and inspiration is transferred to the point of actual creation. The aeroplane moves the individual to a point of desired contact with a speed which would, of course, be a miracle to a former generation.

"There is thus growing into the world of material business a new and

vivid realization of the chief value of that intangible power of intellect.

"In the security markets, the phenomenon of advancing security prices may be the groping of sound anticipation, or investment which shall realize later on the anticipation of today, of the earning power of trained and inspired intelligence. No longer brick and stone and machinery, alone, constitute the capital value of industry investment.

"The economists of the world have failed in the last 15 years, with few exceptions, in forecasting the economic restoration and progress of the world, because they tried to measure these new forces by old axioms. The business man, on the contrary, approaches these problems and their solution in a purely realistic sense. He notes the factors as they daily present themselves, and he finds the practical answer, even though it may not run according to the concept of established text-books."

The A. M. Byers Co., Pittsburgh, has ordered two 10-ton converters, with auxiliary equipment including jack cars, slag cars, ladles, dragout and tilting cranes for its new plant at Ambridge, Pa. This equipment will be furnished by the Pennsylvania Engineering Works, New Castle, Pa.

Steel Company Financed for \$20,000,000

Hanna Furnace Co. Will Supply Hot Metal from Detroit Stacks to Great Lakes Steel Corporation at Ecorse

THE Great Lakes Steel Corporation, which will build an open-hearth plant and finishing mills at Ecorse, Mich., has been financed by the sale of \$20,000,000 in stock, which will be the initial capitalization. The plant will be located on an 80-acre site on the Detroit River, six miles below Detroit. George R. Fink, chairman of the Board of the Michigan Steel Corporation, which has a sheet mill plant at Ecorse, is the organizer of the new company and will be its president and chairman of the board.

The plant, it is announced, will have an annual capacity of 400,000 tons. The plans provide for the erection of six open-hearth furnaces and finishing mills for the manufacture of rerolling and forging billets, slabs, hot and cold-rolled strip, shapes and light plates. The company will work in close relationship with the Hanna Furnace Co., whose two Detroit blast furnaces are only about a mile from the steel plant site. Hot metal for the open-hearth plant will be supplied by the Hanna furnaces. The new company will also work in close relationship with the Michigan Steel Corporation, but a consolidation of the two is not proposed. Completion of the plant in 15 months is expected.

The project has been financed through Mr. Fink's efforts without promotion costs and it is stated that the stock was over-subscribed. The

company will have an authorized capitalization of \$50,000,000. There are 300 stockholders, among them, it is stated, some large automobile manufacturers and other steel consumers.

Officers in addition to Mr. Fink, president, are: Vice-president and secretary, Elmer R. Milburn, director and secretary of the Michigan Steel Corporation; treasurer and assistant secretary, Lacey S. Brown, treasurer of the Michigan Steel Corporation.

In addition to the officers, the following are directors: Charles A. Collins, Cleveland; president Hanna Furnace Co. and vice-president M. A. Hanna Co.; Edward L. Wetstein, general sales manager Michigan Steel Corporation; James N. Jarvie, New York, director Sloss Sheffield Iron & Steel Co., Central Union Trust Co. of New York, Southern Pacific Railroad and Consolidated Gas Co.; George W. Davison, New York, president Central Union Trust Co., director of Union Carbide & Carbon Co., Sloss Sheffield Iron & Steel Co., Continental Insurance Co. and Wabash Railroad; Frank W. Blair, Detroit, president Union Trust Co., Detroit, and affiliated with other financial and industrial corporations; Carlton M. Higbie, Detroit, president of Keane, Higbie & Co., chairman of the board Wilcox-Rich Co., and director of the Murray Corporation of America, of the Reo Motor Car Co. and of Detroit banks.

of which had slightly over 70,000 tons.

Shipments at 77,188 net tons were likewise by far the largest ever reported. The largest total for 1928, 71,224 tons, was reached in March, while the 1927 maximum, also in March, was 71,609 tons. The current figure compares with 56,861 tons in December and 55,432 tons in January, 1928.

Orders booked made a new record at 77,091 tons. This compares with the 1928 maximum of 70,288 tons (March) and with 61,319 tons in December and 62,328 tons in January last year.

Worcester Foundries Have Big Start This Year

The eleven jobbing iron foundries of Worcester, Mass., and vicinity which on Jan. 1 started the operation of a plan to report the details of each month's activities to the Industrial Bureau of the local chamber of commerce, produced 3,841,380 lb. of castings in January, as compared with 2,914,072 lb. in January, 1928, or 32 per cent more. This is accepted as a measure of the activities of the Worcester machine shops, particularly of the machine tool builders, who obtain a very large part of their castings from these foundries. While the figures for February have not been totaled, the foundries report that their tonnage in the month was above that of January, which is a seasonable condition, as January ordinarily finds foundry activities slow in gaining momentum, following the inventory-taking period of their customers' works. January's output was 8 per cent under that for December, which also was a seasonable drop.

Iron and Steel Employment Gains but Wages Dip

Iron and steel plants to the number of 203 reported to the United States Bureau of Labor Statistics an increase of 0.7 per cent in employees on payroll in January, compared with December. The figures were 272,886 in the earlier month and 274,864 in the later month. In spite of this increase in numbers, however, there was a slight decline in total amount of payroll, which, for one week in December, was reported at \$8,652,405, whereas in January the corresponding week showed \$8,624,546.

Similar conditions prevailed under the heading of foundry and machine shop products, where 971 establishments showed an increase of 1.3 per cent in number on payroll, but a decrease of 1.3 per cent in total amount of payroll. Employees increased from 253,637 to 257,035. Meantime, weekly payroll decreased from \$7,771,388 to \$7,672,802.

Machine tool makers numbering 146 reported a gain of 1.6 per cent in number on payroll and a decline of 2.8 per cent in amount of payroll. Hardware makers to the number of 65 showed practically stationary employment numbers, but a decline of

2.9 per cent in payroll. Plants making steam fittings and steam and hot water heating apparatus showed an increase of 11.5 per cent in employees in 111 establishments and an increase of 8.6 per cent in amount of payroll.

Cast iron pipe plants, on the other hand, showed declines of 1.2 per cent in number and of 10.4 per cent in amount of payroll. Structural iron-work establishments numbering 164 showed declines of 3.5 per cent in number on payroll and 8.2 per cent in its amount. Stove-making establishments numbering 112 reported 11.2 per cent fewer employees and a 17.1 per cent smaller total payroll.

New Records in Malleable Castings

Production of malleable castings in January is reported by the Department of Commerce at 73,169 net tons, or 77.5 per cent of the capacity of the manufacturers reporting. This is the largest total ever so reported. It displaces the previous record of 72,205 tons, made in March, 1927. It compares with 59,432 tons in December and with 61,072 tons in January, 1928. The largest months of 1928 were March and October, each

National Forge & Ordnance to Make Electric Steel

The National Forge & Ordnance Co., Irvine, Warren County, Pa., has completed expansion plans and work will start immediately on a new electric steel making plant, which will be in operation shortly after the middle of this year. The new additions will consist of two electric furnaces with adequate soaking pit and heating units, additional forging capacity, and extensive additions to the machine shop.

The company plans to concentrate on high grade alloy steels for specialized work and to widen the range of products to supply demands brought about by the constantly increasing uses for high quality, close specification alloy steels. The machine shop additions will be devoted to large production precision work. C. B. Wilder, president, states that the company expects to use most of the product of the new steel-making capacity and will have only a small tonnage of semi-finished steel for the open market.

General Tariff Revision Opposed

House Leaders See No Need for Sweeping Changes—Representative Bacharach's Statement Thought to Reflect President's Views

WASHINGTON, March 5.—Although President Hoover in his inaugural address referred only briefly to the tariff, the belief grows in Washington that he will be opposed to any general revision. He will deal with this question and with farm relief in his message to Congress upon the assembling of the special session, which is now expected to convene in April. In his formal speech yesterday he said:

"Action upon some of the proposals upon which the Republican party was returned to power, particularly further agricultural relief and limited changes in the tariff, cannot in justice to our farmers, our labor and our manufacturers be postponed. I shall therefore request a special session of Congress for the consideration of these questions. I shall deal with each of them upon the assembly of the Congress."

Much importance is attached to the statement issued last Saturday by Representative Bacharach of New Jersey, chairman of the subcommittee in charge of the metal schedule, after he had breakfasted with Mr. Hoover. Mr. Bacharach said that he was opposed to general tariff revision, and he also made known his opposition to the American valuation plan of assessing duties, which the American Iron and Steel Institute, through its vice-president, John A. Topping, and its special tariff representative, Thomas J. Doherty, has favored in testimony presented to the House Ways and Means Committee at its tariff hearings, which closed late last week.

Although Mr. Bacharach stated that he was giving his personal views, it was hardly believed that he would have issued such a statement immediately after leaving Mr. Hoover if his views did not coincide with those of the new President. There is reason to believe, also, that Mr. Bacharach's attitude is supported by most, if not all, of the other Republican members of the Ways and Means Committee.

Sees No Need for General Revision

Mr. Bacharach's statement follows:

"I see no need for a general revision of the Fordney-McCumber tariff act. The Republican party went before the people last November and asked for reelection on the strength of the protection granted to industry and labor under that act. We admitted that there should be some readjustment of rates to take care of agriculture and those industries which were not adequately provided for in the 1922 act. From the evidence which has been presented to our committee it would appear that the Fordney-McCumber act has worked out very

satisfactorily and that there are only a comparatively few holes that need to be 'plugged up.'

"I think there is little sympathy in the Congress for the adoption of American valuation at this time. Many who originally were for American valuation, both in Congress and outside, are not now in favor of it. I believe that when we come to the writing of the administrative features of the new bill we can make ample provision to take care of under-valuation. I am strongly in favor of rewriting the so-called 'elastic provision' of the present law, so as to put real teeth in it and give the commission adequate power to function efficiently and promptly. The trouble now is that it takes too long a time for the commission to make an investigation and report its findings to the President for action. I feel sure that, if we give the commission and the President the sufficient power to enable them to function under the 'elastic' provision, I am satisfied that Mr. Hoover will see to it that there will not be any prolonged, undue or unnecessary delay in having the applications of those who apply for relief under that paragraph passed upon, and that instead of taking years to get action as now, it will be a matter of months."

Readjustment Rather Than Revision

Chairman Hawley of the House Ways and Means Committee also issued a statement on Saturday, following a meeting of the Republican members of the committee, in which he said that the meeting was held to arrange plans for the readjustment of duties "where the evidence proves that such readjustments are necessary and justifiable." Mr. Hawley's use of the word "readjustment" was taken to mean that he considered a general revision unlikely.

Evidently there is at least one proponent of higher tariffs and the American valuation plan, who does not share the view that Mr. Bacharach's statement necessarily reflects the opinions of President Hoover. This is Joseph R. Grundy, president Pennsylvania Manufacturers' Association. Mr. Grundy charged that "Mr. Bacharach ingeniously hitches his personal views with his visit to President-elect Hoover. It was subtly done, but I have a feeling that it has not been effectively done." Mr. Grundy declared that with very few exceptions every industry which appeared before the Ways and Means Committee condemned the foreign value basis and requested some form of American valuation.

This is a problem that the committee faces and it has been indicated that it may adopt the idea suggested by the National Association of Manu-

facturers to revise the flexible provision of the Fordney-McCumber tariff law. That association also suggested that the President be authorized to transfer articles from or to the free list and proposed a more workable basis of ascertaining costs of production here and abroad.

The subcommittees of the Ways and Means Committee will begin work at once on the mass of testimony they have received from representatives of industries and from various governmental sources. It is the intention to have the bill ready for consideration in the House of Representatives before April 20. All briefs must be filed with the Ways and Means Committee by Saturday of this week. The detailed brief for the American Iron and Steel Institute has not yet been received.

Steel Treathers Organize Chapter in Newark

Another chapter of the American Society for Steel Treating was chartered late last month. It is designated as the Newark chapter, and is made up partly of members who were formerly active in the New York chapter. The new chapter starts out with an enrollment of about 200. W. H. Eisenman, national secretary, met with the new chapter at a dinner Friday, Feb. 22. The officers are: Chairman, William R. Bennett, Bennett Insured Heat Treating Co., Newark; vice-chairman, H. D. McKinney of the Driver-Harris Co., Harrison, N. J.; secretary-treasurer, John H. Johnson, Firth-Sterling Steel Co., New York; chairman of membership committee, Richard W. Thorn, Colonial Steel Co., New York.

Newton Steel Co. Awards Contract for New Plant

The Newton Steel Co., Youngstown, has awarded to Arthur G. McKee & Co. the contract for the design and construction of its sheet mill plant at Monroe, Mich. This will have an initial capacity of 12,000 tons of finished sheets per month, and it is stated that it will reflect the latest developments in the production of high finished sheet products. The McKee contract will also include the preparatory and auxiliary portion of the work, which includes tracks, sewers, dock, unloading, loading and handling equipment at the dock, water supply, etc. It is expected that the plant will be completed by Jan. 1, 1930.

Doubts Benefit from British Steel Tariff

Scottish Institute Speaker Sees More Hope in Lowering of Foreign Barriers—
Says Scientific Discovery Holds Fate of British Industry

THE tariff question as it affects the iron and steel and related industries is commanding attention not only in this country, but also in Great Britain. In an address on conditions and prospects in the steel trade before the West of Scotland Iron and Steel Institute at the Royal Technical College, Glasgow, Dec. 14, Prof. W. R. Scott pointed out that the British iron and steel industry needs either a measure of protection or an abatement of the protection afforded to industry in other countries.

His paper, which is published in full in the December journal of the Scottish institute, emphasized that the war was a period of protection in *excelsis* and that the suddenness of the transition to free trade imposed an exceptionally severe strain on the industry.

A reduction of tariff barriers in foreign countries, in his opinion, offers more hope for real relief than a British tariff. The movement initiated in the World Economic Conference in May, 1927, to remove or diminish those tariff barriers that gravely hamper trade "is the sounder and more fruitful line of advance," Professor Scott asserted, "if one considers how one of the chief customers of the steel industry is affected, namely, the shipping trade. It will be found that in 1925 the world's production of food-stuffs and raw materials was about 17 per cent greater than in 1913, but the volume of trade was only 5 per cent greater. Accordingly, if a freer flow of goods between nations is restored, the shipping trade will benefit and with it the steel industry.

Results of Safeguarding Far from Certain

"It may be objected that protection of the steel industry through a safeguarding duty is more immediate and less uncertain than an international movement, which must be slow and the result of which is open to doubt. As to the last point, substantial progress has already been shown, and the effects of a safeguarding duty on steel are far from certain. Assuming that such a duty afforded a fair measure of protection, the securing of the home market to the extent it was affected would probably be at the expense of increased competition in foreign markets.

"It is sometimes urged that the protection of the home market would enable plants to be more fully employed, but this involves the unconscious assumption that the gain in the home market would not be canceled by a loss in overseas markets. The dominant consideration is that there is at present an excess capacity in the world, and one result of greater com-

One result of greater command of the home market is to concentrate competition overseas.

* * *

The overwhelming demand for steel products comes from capital. The effect of the war has been, temporarily to reduce the purchasing power of savings (British) below the pre-war level.

* * *

The change in the position of Germany from a country that exported capital to one that must import it is reflected in its present industrial position.

* * *

If excess plant capacity is permanent, rationalization is no real benefit.

* * *

Great Britain, with its moderate-sized iron and steel plants, may be better able to adapt or reconstruct them for the development of new processes than countries with heavy investments in large and more modern works.

mand of the home market would be to concentrate competition to a greatly increased degree overseas.

"To some extent the possibilities may be illustrated by recent experience. Comparing the first six months of 1927 and 1928, imports of iron and steel have been reduced by 60 per cent, but production, instead of expanding, has declined."

Low Prices Represent Bid for Capital

In discussing what the British iron and steel industry can do for itself, as distinguished from Government aid, Professor Scott said:

"Broadly speaking, it may be said to be playing for time, namely, to maintain its trade connections until the time arrives when there will be a sufficient supply of capital to enable its plant to be reemployed. From another point of view the low prices of steel products represent a courageous bidding for the available capital and the effort to tempt new works and extensions for which steel is required.

"It cannot be said that the world's steel capacity is in excess of the rate of progress which had been established in pre-war years. Therefore, it is to be inferred that the chief effect of the war on the steel industry has been in relation to demand. The overwhelming demand for steel products comes from capital: in other words, the products of this industry are what are called 'capital goods.' Ships, railroad plant, construction steel, machinery—all represent investments. The effect of the war has

been, temporarily, to reduce the purchasing power of savings below the pre-war level.

Sharp Reduction in British Savings

"It will be remembered that in the report of the Colwyn Committee it was estimated that, as regards the United Kingdom, the purchasing power of the pre-war savings of one year at present prices would be £650,000,000, but the committee was of the opinion that in 1925 the annual savings did not exceed £500,000,000, and might be only £450,000,000; thus there was a deficiency in purchasing power of those savings, as compared with pre-war, of at least £150,000,000. This deficiency in the purchasing power of British savings is calculated by a comparison of the present with the pre-war price level."

The rise in steel prices, he pointed out, has been much below the general average and represents the steel trade's bid for the demand from capital.

"The reduction in the purchasing power of British savings," he continued, "reacts especially on exports of steel, since the buying power of countries in the early stages of development depends on loans made to them, and, for the most part, the country that provides the capital for investment overseas gets the orders for plant and equipment which are purchased from the proceeds of the loan."

He called attention to the fact that the change in the position of Germany from an exporter of capital to an importer had adversely affected its steel industry, while the improved financial condition of the United States was a powerful influence in expanding its steel business. The effects of the supply of capital are also seen in estimated changes in the consumption of steel and such pig iron not used in steel manufacture. In 1925 the United Kingdom had a consumption of 440 lb. per capita, compared with 520 lb. in 1913. The German figure for 1925 was 433 lb., against 575 lb. in 1913, while United States consumption was 1030 lb. in 1925, compared with 818 lb. in 1913.

Urges Better Marketing and Scientific Research

The future of the British iron and steel industry, in Professor Scott's opinion, depends to a large extent on improved selling methods and progress in scientific research.

"British steel works claim a very high degree of excellence in their products, but this requires to be brought home to possible purchasers in a way that they can understand. It is claimed that the best article is the

cheapest in the end, but this has to be proved to the purchaser. Also it is possible that more could be done by the study of the peculiarities of different markets and—what is not less important—the peculiarities of the consumers in those markets,” he said.

Professor Scott places great store in the possibility of originating new processes and new products. He points out that the modern steel industry is a comparatively young one and states that “nothing can be predicted as to the growth of invention, but one has the feeling that in the next generation there will be great—and it may be revolutionary—discoveries in steel making.”

Great Britain, a country with moderate-sized plants, will be in a better position to seize opportunities offered by new inventions than countries with larger and more modern works, according to Professor Scott. The heavy investments represented by the great plants of America and Germany “may prevent the rapid adoption of new improvements, as contrasted with smaller units which may be adapted or reconstructed for the development of new processes.”

Rationalization No Cure-All

Referring to rationalization, Professor Scott said that it has sharp

limitations. “Mere bigness in industry has never impressed me as it seems to do Americans, and, as it appears, some of our public officials. Even multi-millionaires and civil servants might sometimes spare a thought for the fate of Humpty Dumpty. Wherever costs per unit increase less rapidly than the output increases there is room for expansion in the size of the undertaking. At the same time, unless the prospective saving is to be lost, or perhaps more than lost, it is necessary to perfect organization, *pari passu*, with extension. Accordingly, there can be no general rule; everything depends upon the conditions of a particular case.

“One aspect of rationalization is particularly relevant to existing circumstances in the steel industry—that is the plan which it offers for dealing with excess capacity. Here it is necessary to be precise as to the way in which the position is conceived. This aspect of rationalization is a species of rationing when the quantity of plant is in excess of the demand. That excess may be of two kinds—either permanent or temporary. If it is permanent, rationalization is no real benefit. It means keeping superfluous works in being at a charge which, one way or another, is imposed on the industry as a whole. One hopes that there is a

fair prospect of efficient plants being fairly adequately employed in the future. The present period, in that case, is one to be bridged over with the minimum of disturbance and loss. From that point of view there is a good deal to be said for an agreement among British steel producers regarding stabilization of output; and, extending from that, a possible participation in the European steel agreement.

“There are two main difficulties. British manufacturers have not developed what may be called the ‘cartel mind.’ While it has been shown to have advantages in the steel trade, it must be recognized that it is liable to stunt some of the qualities which have made the industry great in this country. Also, on the analogy of the International Rail Makers’ Association, it might follow that such participation would tend to concentrate British exports on the markets of the dominions, the colonies and the few foreign countries where connections are well established. While these are markets with immense powers of expansion, it has to be remembered that the more important parts are at present very highly protected, and, if that policy continues, the possible scope for exports to such markets will be restricted.”

Steel Company Earnings Last Year Ahead of 1927 but Under 1926

FIFTEEN leading steel producing companies, with an ingot capacity of 46,410,000 tons, or approximately 78 per cent of the country's total theoretical capacity, had net profits in 1928 of \$198,051,000. Based on a stockholders' investment, or the total common and preferred stocks and surplus, at the beginning of the year, of \$2,873,222,000, the percentage of return in 1928 was 6.9 per cent. In 1927 these same companies earned \$147,189,000, or a return of 5.2 per cent,

while in 1926 their profits amounted to \$199,279,000, equivalent to 7.4 per cent on stockholders' investment. Where the annual statements have not yet been issued, these figures are based on preliminary statements of quarterly earnings.

Excluding the United States Steel Corporation, the profits of these companies amounted to \$84,052,000, a return of 7.2 per cent. In the preceding year the corresponding figure was \$59,292,000, a return of 5.2 per cent,

while in 1926 the total profits of the independent companies amounted to \$82,612,000, a return of 7.7 per cent on a smaller stockholders' investment.

Since the accompanying table was prepared the 1928 profits of the Ludlum Steel Co., Watervliet, N. Y., have been reported as \$586,610, a return of 16.5 per cent on stockholders' investment. In 1927 the company earned \$225,436, a return of 6.1 per cent, as compared with \$285,679, or a return of 7.7 per cent, in 1926.

Net Profits of 15 Leading Steel Producers During Last Three Years (In Thousands of Dollars)

Name of Company	1928 Capacity Ingot (Net Tons)	1926			1927			1928		
		Total Stockholders' Value	Net Profits	Per Cent Return	Total Stockholders' Value	Net Profits	Per Cent Return	Total Stockholders' Value	Net Profits	Per Cent Return
American Rolling Mill Co.	1,750,000	\$45,909	\$4,064	8.8	\$47,298	\$3,749	7.9	\$54,038	\$6,675	12.3
Bethlehem Steel Corporation.	7,900,000	343,143	20,246	5.9	392,283	15,826	4.0	401,319	18,586	4.6
Central Alloy Steel Corporation.	1,400,000	63,032	3,331	5.3	62,749	2,726	4.3	62,379	4,903	7.8
Crucible Steel Co. of America.	950,000	102,790	6,548	6.4	105,988	5,617	5.3	105,267	5,634	5.4
Donner Steel Co., Inc.	540,000	15,492	737	4.7	15,868	372	2.3	15,429	1,343	8.7
Gulf States Steel Co.	288,000	17,621	800	4.5	17,656	756	4.3	19,540	925	4.8
Inland Steel Co.	1,800,000	64,830	7,148	11.0	67,120	6,807	10.1	70,270	9,334	13.3
Interstate Iron and Steel Co.	375,000	9,889	900	9.1	9,788	410	4.2	9,711	1,024	10.5
Jones & Laughlin Steel Corporation.	3,000,000	155,125	15,149	9.8	163,638	11,239	6.9	169,077	15,569	9.2
Otis Steel Co.	421,000	22,091	1,907	8.6	21,407	1,383	6.5	22,174	3,902	17.6
Republic Iron & Steel Co.	1,300,000	88,562	5,065	5.7	89,826	3,018	3.3	89,904	4,710	5.2
Sharon Steel Hoop Co.	400,000	15,297	1,296	8.5	15,464	556	3.6	18,001	972	5.4
Superior Steel Corporation. ....	.....	4,792	272	5.7	4,914	*190	..	4,724	29	0.6
United States Steel Corporation.	23,046,000	1,630,447	116,667	7.2	1,692,086	87,897	5.2	1,704,950	113,999	6.7
Youngstown Sheet & Tube Co.	3,240,000	122,623	15,149	12.3	131,879	7,023	5.3	126,439	10,446	8.3
Total	46,410,000	\$2,701,643	\$199,279	7.4	\$2,837,974	\$147,189	5.2	\$2,873,222	\$198,051	6.9
Total without U. S. Steel.	23,364,000	\$1,071,196	\$82,612	7.7	\$1,145,888	\$59,292	5.2	\$1,168,272	\$84,052	7.2

*Deficit.

This Issue in Brief

In chromium-plating, lead anodes are preferable, if properly taken care of, says investigator. When iron anodes are used, iron goes into solution, increasing the power necessary for plating.—Page 671.

* * *

High resistance to acids liberating hydrogen is obtained by using iron-chromium-nickel steel containing 15 per cent nickel or more. Where nitric and sulphurous acids are present, high chromium gives best results. Nickel-molybdenum alloys with 20 per cent molybdenum are highly resistant to hydrochloric acid.—Page 668.

* * *

Drills 16 1-in. holes at the rate of 1 in. a second. Feed of special drilling machine working on fiber blocks is obtained by a cam which lifts the table seven times a minute.—Page 674.

* * *

Tungsten carbide tools and dies contain between 83.0 and 95.85 per cent tungsten and 3.91 to 5.68 per cent carbon. Tool materials analyzed contained no cobalt, while two die materials had 4.5 per cent and 6.10 per cent.—Page 674.

* * *

Chromium-plating bath should have small quantities of sulphate or equivalent added at intervals. Sulphate should amount to about 1 per cent of the chromic acid added. Most convenient way is by adding sulphuric acid. A deficiency of sulphate gives the plate areas of brown hydroxide.—Page 671.

* * *

Little men (150 lb.) more efficient than big men in operating hoists at loads up to 90 lb. Over that weight big men (180 lb.) operate faster. Endurance of big men is only slightly greater. Men working in pairs show only slightly greater speed.—Page 676.

Rail fissures accountable for 573 train accidents in 1927. Fissures in rails in use are automatically detected and marked with paint by detector apparatus mounted in inspection car. Flaws interrupt flow of electric current, actuating recording and marking devices.—Page 681.

* * *

Refuses to sell to price-cutters and quotes United States Supreme Court decision as authority. Pipe manufacturer will sell only to distributors who will observe its minimum resale price schedule.—Page 682.

* * *

Sweeping changes in metal tariff schedule opposed by President Hoover, Washington believes. Statement made by metal schedule chairman is believed to reflect President's views, although one active worker for higher tariff denies this.—Page 684.

* * *

New aluminum alloy has high tensile strength. "Scleron," German alloy, has ultimate strength of 70,000 lb. per sq. in., in hard form. In soft form it can be pressed, drawn and bent.—Page 718.

* * *

Eliminates need for annual inventory by making a physical count of stock of each part whenever new supply is received. Thus a perpetual inventory and constant check are maintained.—Page 663.

* * *

Order chart is key to machinery builder's forecasting system, which helps him take advantage of high peaks and minimize losses due to business declines. Orders are calculated on a logarithmic chart, one peak to the next representing a complete cycle. Information is drawn from many sources, so that position in the cycle may be fixed as accurately as possible for inventory control.—Page 662.

Cost of building each machine is kept separately. Record consists of material cost, plus labor, plus administration and selling expense. Annual check-up of costs reveals a discrepancy of less than ½ of 1 per cent between individual records and totals.—Page 663.

* * *

Boiler plate corrosion may be reduced by using acid-resisting steel. Cracks in boiler plate steel are due to action of a corrodent on the metal while under stress, giving rise to formation of intercrystalline fissuring, investigators declare.—Page 666.

* * *

Cold-water quenching of duralumin makes it more resistant to embrittlement than does hot water or hot oil quenching, says metallurgist. Finds embrittling is due to localized corrosion.—Page 667.

* * *

Better coke produced by heating by-product coke ovens with blast furnace gas. Coke is pushed at the same temperature as when coal gas is used. Blast furnace gas gives more uniform distribution of heat.—Page 666.

* * *

Tin can blackening can be prevented by coating the cans with "C-enamel," which is a lacquer containing a tiny quantity of zinc oxide.—Page 668.

* * *

Close check on business is obtained by preparing monthly profit and loss statements, available within 10 days after close of period. Machinery builder is thus able to watch his expenses and costs closely, and is in a position to take the quick action required in a sharply fluctuating business.—Page 661.

* * *

Gain of 3.1 per cent in daily pig iron output in February. Average production was 114,507 tons a day, largest in 34 months, and second largest February on record. Gain of 5 furnaces in month; 207 furnaces in blast March 1.—Page 692.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

President Hoover

BUSINESS expects much from the new President. It will not be disappointed. It realizes that a man of great capacity is at the head of government. Superhuman feats to establish epochal reforms forthwith and to enhance prosperity by edict are looked for only among unreasoning groups. The President will not abandon the engineer's habit of basing action on facts. Fears expressed in some quarters of impulsive action fail to recognize the type of the Presidential mind. Even anything of the crusader attitude, be it for change in judicial procedure or otherwise, will be subject to the slow process of fact finding.

The Steel Corporation's Financing

SINCE Wall Street has lived for months in an atmosphere highly charged with rumors of extra dividends, stock split-ups and bonuses, it was not surprising that the new financing announced by the Steel Corporation last week was treated, in sundry attempts at forecast, as one more case of beneficial distribution to stockholders. That description proved to be quite wide of the mark.

What the Finance Committee had worked out—and it may fairly be called the most highly constructive measure in all the record of Steel Corporation finance—is a complete recasting of the corporation's capital structure. Reversing the well-remembered procedure of the Perkins plan of 1902, which reduced the preferred stock issue and correspondingly increased the bonded debt, the new plan calls for the retirement of the \$271,000,000 of 5 per cent bonds of the corporation, leaving only the bonds of subsidiary companies, roundly \$146,000,000. As part of the outstanding bonds are callable at 115 and part at 110, about \$305,000,000 will be required for their redemption.

In large part the funds for the bond retirement will be secured by the sale of additional common stock. At present \$711,623,500 of such stock is outstanding. It is proposed to increase the authorized common stock to \$1,250,000,000. How much new stock will be issued and on what terms will not be known until the formal offer is made, at some time before the annual meeting of the stockholders on April 30.

The statement of the Finance Committee points out the obvious advantage to preferred stockholders in eliminating the prior lien of the bonds and the fixed charge which stands ahead of such stockholders' rights. Interest and sinking fund requirements of the two issues of 5 per cent bonds now amount to \$29,247,350 a year, and it is stated that this saving will

exceed the dividend requirements, at the existing 7 per cent rate, of the amount of new common stock to be presently issued.

In financial circles the view is current that the Steel Corporation will offer rights to buy the new common stock in the ratio of one share to every six now owned. That would mean 1,186,039 additional shares, which at 150—if this reported figure should be formally announced—would yield about \$178,000,000 of the needed \$305,000,000. The statement says that the corporation's surplus will be drawn upon for the redemption of part of the outstanding bonds, but it may be questioned if \$127,000,000 will be so used, or roundly \$100,000,000 apart from the recent income tax refund by the Government. If the new stock offer should be on a one-to-five basis, the stock sale (if at 150) would yield about \$210,000,000 of the needed \$305,000,000.

Whatever Wall Street may have forgotten or ignored, in the speculative riot of the past half year, it is quite certain that the members of the Finance Committee have not overlooked any development of recent years in the steel industry or in the business of the Steel Corporation that bears in any material way on this epochal stroke of financing. Their exhaustive study for months of the corporation's financial history has left them, it is safe to say, with no belief that the steel industry has come into an era of exemption from alternating prosperity and slackening—even though the "feast or famine" days are gone. They must have taken full account of the fact that so recently as 1927, the year of the 40 per cent stock dividend (the fruit of no less than 26 years of steady replacement of "water" by productive plant), the corporation did not earn the \$7 dividend on the present volume of common stock. Also, they would not forget that in the lean fourth quarter of that year only \$1.05 was earned on the common shares, or at the yearly rate of \$4.20. Nor would they underrate the significance of such changes in property values as were caused last year, for example, by the inroads of seamless as well as electrically welded pipe on the furnace lap-welded product—a development for the meeting of which the corporation must spend \$25,000,000 in the replacement of its great pipe plant at McKeesport.

The corporation heads have taken a long look ahead in bringing out their plan, and the plan has much more in it and back of it than the Street and the tape-readers seem to have found. Its authors plainly see the new place which common stocks have taken in the good opinion of investors, the prosperity the steel industry has enjoyed for many months, and the sustained high level of stock prices as a most opportune conjunction

of influences that favor the launching of their plan. Strong, even rock-ribbed, as the financial position of the corporation has been in the past 15 years, the cancelling of so large a part of its funded debt will make its future doubly secure. Its competitive position both in domestic and world trade will be reinforced, as will its ability to withstand the stress of depression should the industry fall on slack times.

The good effect of the new plan is not limited to the Steel Corporation and its stockholders. Unique as is the Steel Corporation's position in several respects, particularly in its ownership of ore and other roads and its freight advantages from having plants in three great producing districts, it has a number of competitors whose funded debt is much smaller in proportion to capitalization than its own. Some other steel companies might well follow the corporation's example.

In that connection the progress the industry has made in the past year in price stabilization will affect in no small degree the public's attitude toward steel stocks. Investors are not likely to prefer common stocks to bonds if producers cannot maintain the stand they have taken for more enlightened selling. That is a consideration which should keep up a steady pressure on steel manufacturers to make their marketing as successful as their manufacturing.

The Tariff and Export Trade

WITH tariff revision imminent in this country, the subject of protection is commanding attention in Great Britain also. Having shown no recovery comparable with that of the American iron and steel industry, British steel interests are correspondingly in greater need of aid, through a tariff or some other means. Nevertheless sentiment in Great Britain, if one is to judge from an address before the West of Scotland Iron and Steel Institute abstracted in this issue, is by no means undivided on the wisdom of setting up tariff walls.

British opinion, of course, is colored by many years of free trade experience, as well as by the fact that the steel industry in Great Britain depends on exports for such a large proportion of its tonnage. Protection is considered not alone for its probable effects on domestic business, but also in relation to foreign trade. Advantages from a lessening of competition at home are weighed against possible losses through a sharpening of competition abroad.

American makers of iron and steel are not yet so vitally concerned about export business, although undoubtedly the trend, for manufacturers in virtually all lines, is toward greater cultivation of world trade. The automobile industry is particularly alive to the possibilities of expanding its exports and is sensitive to any moves likely to hamper that growth. Aside from theoretical considerations regarding the benefits of a further upward adjustment of our tariff, practical business judgment cannot overlook the untoward psychological effect of such a revision on our customers abroad, with retaliatory duties a possibility.

Some measure of reassurance comes in our Washington report of this week, intimating that the new President opposes a general revision of the tariff and will try to restrict Congressional action to a readjustment of such duties as are plainly inadequate. Undoubtedly there are American products that have

special claim to further protection. Each of these should receive due attention, with full recognition of the fact that our immigration act, which is really a tariff on labor, imposes an extra cost that should be offset.

A Definition for Alloy Steel

THERE seems to be reason for attempting to define the term alloy steel, even if for no other purpose than to lend accuracy to statistical records. Lacking such a general understanding, one manufacturer might say that a steel containing manganese should not be classed as an alloy steel until the manganese gets above 7 per cent; while another would class anything of special analysis (like high-sulphur screw stock) in the alloy category.

In attempting to establish such a definition it is well to give more weight to present-day information and practice than to traditional authority. For instance; an English text book much used by the older generation (W. H. Greenwood, "Steel and Iron," 1884), says that steel is a compound of iron and carbon; "all other elements must still be regarded as impurities, notwithstanding that it may be advantageous to introduce some of them to impart special qualities to the metal."

Dr. Henry Marion Howe, in his "Metallurgy of Steel" 1890, favors a term "special steel," and while he does not define it, his meaning may be inferred from the following quotation: "Chrome steel is steel whose physical properties are influenced more by the chromium than by the other non-ferrous elements which it contains."

Somewhat later the Englishmen, Harbord and Hall, in the first volume of their "Metallurgy of Steel," say that steel consists almost entirely of iron, carbon and manganese. To them special steels are "steels which result from mixing with iron other metals, with or without carbon."

Current steel-making practice and the state of scientific knowledge influenced these as well as later definitions. For instance, a committee at the 1913 meeting of the International Association for Testing Materials (the work was done largely by Messrs. Howe, Sauveur and H. H. Campbell) presented the following definition: "Special steel: Steel which owes its distinctive properties chiefly to some element or elements other than carbon, or jointly to such other element and carbon," and remarked that there is no agreement on the boundary between special steels and carbon steels.

Instead of defining this line of demarcation, Henry D. Hibbard's definitions ("Manufacture and Uses of Alloy Steels," 1915) introduce two hazy boundaries where one existed before. He says:

Simple steel, often called carbon steel, consists chiefly of iron, carbon and manganese. Other elements are always present, but are not essential to the formation of the steel, and the content of carbon or manganese, or both, may be very small.

Alloy steel is steel that contains one or more elements other than carbon in sufficient proportion to modify or improve substantially and positively some of its useful properties.

Alloy-treated steel is a simple steel to which one or more alloying elements have been added for curative purposes, but in which the excess of the

element or elements is not enough to make it an alloy steel.

While Camp and Francis ("The Making, Shaping and Treating of Steel," 1925) quote Hibbard's definitions with approval, they say that the customs of the Carnegie Steel Co. conform closer to the following: "An alloy steel is steel, made by the open-hearth or the electric process, which contains, in addition to carbon, some element or elements added with the object of modifying and substantially improving its mechanical properties in such a way as to make it more suitable for the purpose for which it is intended." They remark that this excludes rust-resisting copper-bearing steel, phosphoric sheet bar, high-sulphur screw stock, and steels containing an excess of deoxidizers (manganese or silicon).

It is apparent from this brief review that one who desires precision must define "steel" as well as "alloy steel," and the definition of the latter must contain the principle whereby the amount and kind of alloying elements may be specified. In the interest of brevity and as a basis of discussion, the following is, therefore, submitted:

Steel is a malleable alloy of iron and iron carbide.

Alloy steel is a carefully made steel containing a substantial quantity of another metal intentionally added to improve the physical properties.

Suggested chemical minimums are:

Manganese—1.0 per cent (but not Bessemer steels).

Silicon—0.3 per cent (but not steel castings).

Nickel—0.5 per cent.

Chromium—0.5 per cent.

Molybdenum—0.25 per cent.

Tungsten—1.0 per cent.

Vanadium—0.15 per cent.

Aluminum—0.5 per cent.

Copper—0.25 per cent.

It may be noted that the above definition excludes high-sulphur and phosphorus material, but includes corrosion resisting steels or those especially valuable for magnetic or electrical characteristics. It would exclude Bessemer steel rails recarburized with spiegel, or steels from acid-lined furnaces containing high residual silicon.

The minimum limits represent the content necessary if only one alloying element is present. Thus, less than 0.25 per cent molybdenum may usefully be added to chromium steel, but it would be classed as an alloy steel by virtue of the chromium content. For an iron-carbon-molybdenum combination, the molybdenum should be at least 0.25, as shown in the table, to improve the physical properties. Then the metal would conform to the proposed definition of alloy steel.

Field of the Iron Age

OCCASIONAL measures of the magnitude of the field covered by THE IRON AGE become available in the shape of returns of the Census Bureau. Those for 1927, which have now appeared, show that the value of manufactured products of the five groups specifically in the metal-working line (out of 16 groups altogether) was about 32½ per cent of the value of all manufactured goods. They represent an aggregate product of \$20,227,039,000. The five

groups are iron and steel and their products, non-ferrous metals and products, machinery, transportation equipment (air, land and water) and railroad repair shops.

These five groups were represented by about 30,000 manufacturing establishments with 2,915,000 wage earners. They paid wages aggregating in 1927 \$4,385,000,000, or an average of \$1,504 for each wage earner. They bought raw or partly processed materials, including fuels and power, to the extent of almost \$11,000,000,000 and they added to the value of those materials, through the process of manufacturing, a total of \$9,390,000,000.

Increasing integration not only of these plants but of manufacturing plants in general is shown by the steady increase in the value added by the manufacturing process to the materials purchased. For each \$100 of materials the five metal-working groups added \$86.64 of value in putting the materials through their plants, as compared with \$81.61 two years earlier. This represents an increase of 6.2 per cent and is in a sense a measure of integration, accompanied by economies in manufacturing processes.

While the 11 groups outside the direct field of metal-working made a similar gain of about 6 per cent, it was at a considerably lower level. For each \$100 of materials, these other groups added \$75.44 to value in 1927 and \$71.22 in 1925.

Metal-working as represented by the five groups occupies about 35 per cent of all the wage earners in industry and pays more than 40 per cent of all the wages. The average wage in that group is more than one-fourth greater than in the 11 industries outside of metal-working, which eleven paid only \$1,189, on the average, to each wage earner in 1927.

Water Power and Fuel Economy

GEOLOGICAL SURVEY figures show that the total capacity in water power plants of the United States was 12,571,530 horsepower on Jan. 1, 1929, representing an increase of 10.4 per cent during the year. Each of the two preceding years had shown only 4.9 per cent, while there had been more than 10 per cent increase in both 1925 and 1924.

Thus the question comes up whether water power development is maintaining its pace. It did not do so in 1926 and 1927. Last year it did well enough, but it did not catch up with the previous pace. There is a definite reason for a slackening and that is the increasing economy of steam plants operated by fuel. The statistics of public utility operations published for a number of years past show what remarkable strides have been made in that quarter. A report just issued states that in 1928 the utilities averaged 1.76 pounds of coal per kilowatt-hour, against 3.2 pounds in 1919, the total decrease in nine years being 45 per cent. That would be an average decrease of 0.16 pound per annum, while the decrease 1927 to 1928 was one-half of that. It does not follow, of course, that all utilities are thus progressing, for the latest decreases may be due chiefly to the laggards catching up, thus pulling down the average.

With the fuels so cheap—for coal, petroleum and natural gas are all cheap—and with such economies in

their use, water power has strong competition. The cost of transportation, however, gives water power great advantages at some points when at other points it may be entirely out of the question. There is no chance of coal freights being greatly reduced, while natural gas, of little value until it is brought to market, is being transported in long pipe lines, the cost of an individual line not infrequently running into the tens of millions of dollars.

Without a precise computation one cannot form a definite conception of the importance of developed water power in the general economy. This is supplied by statistics of the Bureau of Mines, reducing everything to British thermal units. The last report was issued Nov. 24, 1928, carrying the computations through the year 1927. As 1927 was a lean year in coal the figures for both 1926 and 1927 are given below. They represent, in trillions of B.t.u., the fuels and the water power reduced to a fuel equivalent. It will be recognized, of course, in considering the figures that there is no direct comparison of "power" as ordinarily understood, for while the water development is power, the fuels are taken in their aggregate, whether or not they are actually used for the generation of power:

	Trillions of B.t.u.	
	1926	1927
Anthracite	2,297	2,179
Bituminous coal.....	15,022	13,565
Domestic oil.....	4,625	5,407
Imported oil.....	362	350
Natural gas.....	1,411	1,554
Water power.....	1,492	1,687
Total	25,209	24,742

Water power represented the equivalent of 6.0 per cent of all the fuels in 1925, 6.3 per cent in 1926 and 7.3 per cent in 1927. For the present year the proportion would probably lie between 7 and 8 per cent. A large part of the fuel, of course, is used in doing things which water power cannot do—in domestic heating, in smelting and industrial heating operations, in operating internal combustion engines, etc.

Profits by Careful Budgeting

(Concluded from page 663)

the part is considered worthless, is scrapped and is charged off the books.

At the beginning of each year the management budgets all expenses by departments and appropriates specific sums for betterments. While it obviously is impossible to anticipate all expenditures for improvements during the ensuing 12 months, nevertheless each department head is asked to submit his estimate of the budget for improvements which ought to be made in his department. The method by which department heads justify appropriations for improvements is interesting. For instance, if the shop superintendent wants to tool up for a given job, he has the cost department prepare a statement showing the advantages of such tooling from a financial standpoint.

He supplements this statement with another showing the advantages from a time standpoint. He then presents the statements to the management and requests an appropriation to cover the cost of the improvement. By this method the financial requirements for operating expenses, betterments and for stock purposes are known sufficiently far ahead to make adequate preparation for meeting them.

Complete Statement Prepared at End of Each Four-Week Period

At the end of each accounting period (four weeks) the accounting department prepares for the management a statement of factory, engineering, administration and selling expenses. Opposite each item is shown the amount budgeted, the sum actually expended and the total expense for the preceding period. Each executive must account to the management whenever his expenses exceed his budget. If an increase in sales or some extraordinary development occurs, he has the privilege of requesting an upward revision of his budget, and contrariwise, if the management feels that the conditions warrant a decrease, an executive may be called upon to show why his budget should not be cut.

Each month the accounting department furnishes the management the following reports:

1. Operating statement, showing profit and loss for the month.
2. Financial statement, showing the condition of the company at the end of the month.
3. Expense statement, showing actual expenses as against the budget and as against the previous month's record.
4. Statements showing the cost and selling price of all machines shipped during the month, with the resulting profits or losses.

By means of these statements the management can keep a close check on all departments to see that they are operating efficiently, so far as finances are concerned. It also knows whether its products are being priced so as to yield a fair profit, what financial condition the company is in and the volume of products shipped during the previous month.

Correspondence

Specifications for Steel Castings

To the Editor: In the notice of the work of the sub-sub-committee on alloy steel castings of the American Society for Testing Materials printed in the Jan. 17 number of *THE IRON AGE*, page 225, the statement is made that the present specification for austenitic manganese steel castings is being revamped. This is an error, as no such specification now exists, but the committee is engaged in drawing up such a specification.

The sub-sub-committee has not yet come to an agreement as to the minimum physical properties that should be specified for alloy steel castings containing smaller percentages of nickel, manganese, or some other metal. The figures given in *THE IRON AGE* notice have been discussed tentatively, but have not been accepted as a basis for specification work.

JOHN HOWE HALL,
Metallurgical Engineer.

Taylor-Wharton Iron & Steel Co.,
High Bridge, N. J.

Schedule of the next instalments of the Business Analysis and Forecast, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows: March 21—Position of Iron and Steel Producers; April 4—Activity in Steel Consuming Industries.

Sharp Gain in Iron Output in February

Best Month in Last 34—Second Largest February—Daily Rate Up
3.1 Per Cent—Net Gain of 5 Furnaces

PRODUCTION of pig iron in February was the largest for any month since April, 1926, and exceeded all February records except in 1925. The daily rate last month of 114,507 gross tons compares with 115,004 tons per day in April, 1926, and with 114,791 tons as the daily rate in February, 1925.

With all companies heard from, total February production was 3,206,185 tons, or 114,507 tons per day for the 28 days, as compared with 3,442,770 tons, or 111,044 tons per day for the 31 days in January. This is a gain last month of 3463 tons per day, or 3.1 per cent. In January the gain in daily rate was 2339 tons over Decem-

ber, or 2.15 per cent. In December there was a decline from November of 1.25 per cent in daily output. A year ago, or in February, 1928, the daily rate was 100,004 tons, making the February rate this year 14.5 per cent higher.

Operating Rate Active on March 1

There were 207 furnaces active on March 1 having an estimated operating rate of 115,770 tons per day. On Feb. 1, the 202 furnaces in blast had an estimated operating rate of 111,985 tons per day. In February nine furnaces were blown in and four went out, a net increase of five. In January the net increase was one furnace.

Of the nine furnaces blown in during February four were Steel Corporation stacks, two were independent steel company furnaces and three belonged to merchant producers. Of the four furnaces shut down last month, two were merchant stacks, with one each credited to the Steel Corporation and to an independent steel company. Thus there was a net gain of four steel-making and one merchant stack.

Sharp Gain in Steel-Making Iron

Steel-making iron increased decidedly last month and merchant iron fell off from January. At 89,246 tons per day steel-making iron exceeded

Daily Average Production of Coke Pig Iron in the United States
by Months Since Jan. 1, 1925—Gross Tons

	1925	1926	1927	1928	1929
Jan.	108,720	106,974	100,123	92,573	111,044
Feb.	114,791	104,408	105,024	100,004	114,507
Mar.	114,975	111,032	112,366	103,215	.....
Apr.	108,632	115,004	114,074	106,183	.....
May	94,542	112,304	109,385	105,931	.....
June	89,115	107,844	102,988	102,733	.....
½ year...	105,039	109,660	107,351	101,763	.....
July	85,936	103,978	95,199	99,091	.....
Aug.	87,241	103,241	95,073	101,180	.....
Sept.	90,873	104,543	92,498	102,077	.....
Oct.	97,528	107,553	89,810	108,832	.....
Nov.	100,767	107,890	88,279	110,084	.....
Dec.	104,853	99,712	86,960	108,705	.....
Year	99,735	107,043	99,266	103,382	.....

Pig Iron Production by Districts, Gross Tons

	February (28 days)	January (31 days)	December (31 days)	November (30 days)
New York and Mass....	219,940	231,511	201,594	208,651
Lehigh Valley.....	85,686	94,285	87,479	100,423
Schuylkill Valley.....	55,843	51,532	63,984	60,185
Lower Susq. and Leba- non Valleys.....	31,403	33,576	33,666	31,106
Pittsburgh district....	655,405	717,088	719,542	747,080
Shenango Valley.....	115,619	112,709	99,478	99,432
Western Pennsylvania..	135,767	148,098	152,890	144,135
Maryland, Va. and Ky..	87,889	98,366	98,750	105,444
Wheeling district.....	129,082	145,943	131,813	133,237
Mahoning Valley.....	331,653	346,603	329,973	317,439
Central and North'n Ohio	303,770	338,616	343,959	322,405
Southern Ohio.....	40,351	48,110	43,370	41,203
Illinois and Indiana....	666,236	674,037	657,387	615,969
Mich., Minn., Mo., Wis., Colo. and Utah.....	130,649	143,873	150,737	138,163
Alabama.....	211,061	252,468	249,142	231,366
Tennessee.....	5,831	5,555	6,082	6,085
Total	3,206,185	3,442,370	3,369,846	3,302,523

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
February, 1928.....	78,444	21,560	100,004
March	83,489	19,726	103,215
April	85,183	21,000	106,183
May	85,576	20,355	105,931
June	81,630	21,103	102,733
July	79,513	19,578	99,091
August	82,642	18,538	101,180
September	82,590	19,487	102,077
October	88,051	20,781	108,832
November	88,474	21,610	110,084
December	85,415	23,290	108,705
January, 1929	85,580	25,514	111,044
February	89,246	25,261	114,507

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

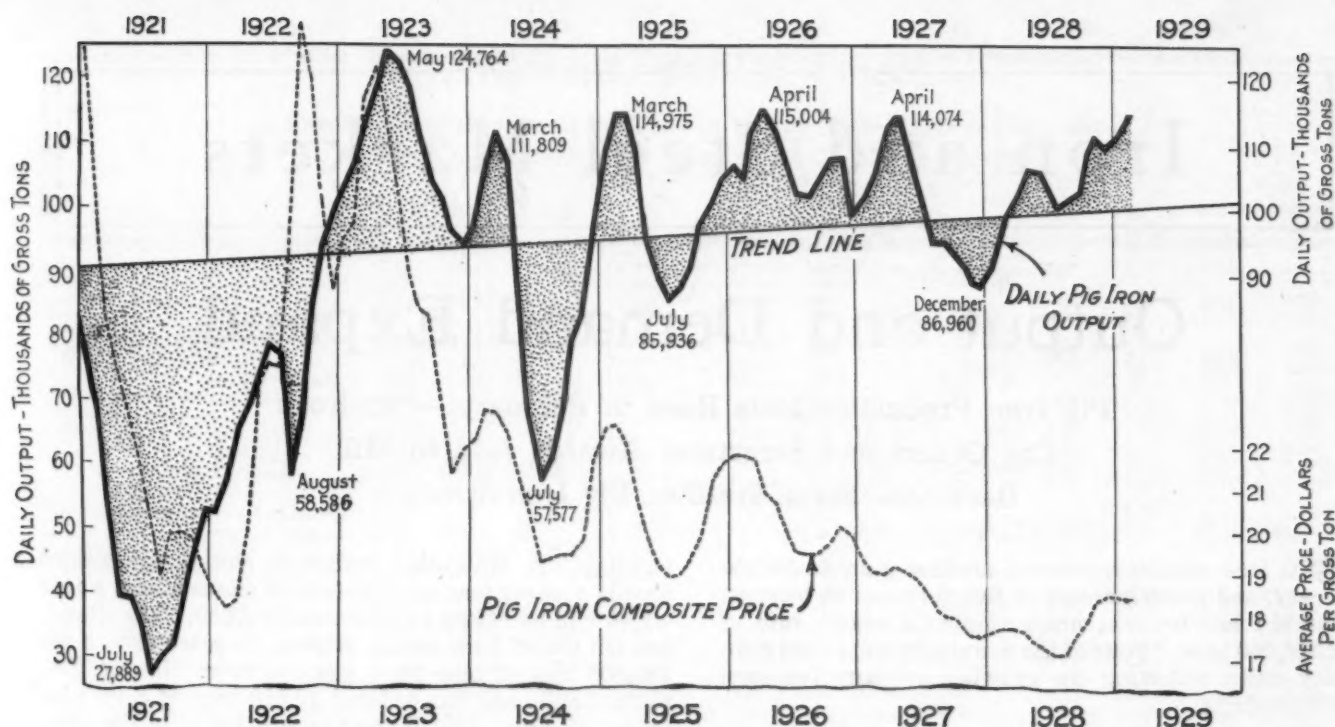
	March 1		Feb. 1	
	Number in Blast	Gross Tons per Day	Number in Blast	Gross Tons per Day
New York:				
Buffalo	13	6,770	13	6,560
Other N. Y. and Mass..	3	1,090	3	1,180
New Jersey:	0	.....	0	.....
Pennsylvania:				
Lehigh Valley	7	3,160*	6	3,040*
Schuylkill Valley	5	2,190	4	1,660
Susquehanna Valley....	2	1,120	2	1,085
Ferromanganese	0	.....	0	.....
Lebanon Valley.....	0	.....	0	.....
Ferromanganese	0	.....	0	.....
Pittsburgh District....	36	23,285	35	22,730
Ferro. and Spiegeleisen	3	570	3	520*
Shenango Valley.....	8	4,415	7	3,635
Western Pennsylvania..	8	3,980	9	4,385
Ferromanganese	2	400	2	395
Maryland	5	2,665	5	2,575
Wheeling District.....	8	4,610	8	4,705
Ohio:				
Mahoning Valley.....	20	11,845	20	11,465
Central and Northern...	18	10,850	18	10,925
Southern	3	1,065	4	1,550
Illinois and Indiana....	36	24,970	33	22,700
Mich., Wis. and Minn....	5	2,280	6	2,785
Colo., Mo. and Utah.....	4	1,985	4	1,855
The South:				
Virginia	0	.....	0	.....
Ferromanganese	1	95	1	95
Kentucky	1	375	1	370
Alabama	18	7,840	17	7,580
Ferromanganese	0	.....	0	.....
Tennessee	1	210	1	190
Total	207	115,770	202	111,985

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months
Beginning Jan. 1, 1927—Gross Tons

	1927	1928	1929
Jan.	3,103,820	2,869,761	3,442,370
Feb.	2,940,679	2,900,126	3,206,185
2 mos.....	6,044,499	5,769,887	6,648,555
Mar.	3,483,362	3,199,674	.....
Apr.	3,422,226	3,185,504	.....
May	3,390,940	3,283,856	.....
June	3,089,651	3,082,000	.....
½ year	19,430,678	18,520,921	.....
July	2,951,160	3,071,824	.....
Aug.	2,947,276	3,136,570	.....
Sept.	2,774,949	3,062,314	.....
Oct.	2,784,112	3,373,806	.....
Nov.	2,648,376	3,302,523	.....
Dec.	2,695,755	3,369,846	.....
Year*	36,232,306	37,837,804	.....

*These totals do not include charcoal pig iron. The 1927 production of this iron was 164,569 tons.



Daily Pig Iron Output in February Was 3.1 Per Cent More Than in January; Composite Price Slightly Off
Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 423,000 tons

January by 3716 tons, or 4.3 per cent. Merchant iron at 25,261 tons per day last month was 253 tons less than in January.

Ferromanganese Production

Output of ferromanganese in February was 25,978 tons as compared with 28,208 tons in January. It was close to the monthly average of 26,000 tons in 1928. Two companies were producing spiegeleisen last month and in January.

Possibly Active Stacks Reduced

Five furnaces have recently been dismantled or abandoned. These are the "B" furnace of the Worth group at Coatesville, Pa., of the Bethlehem Steel Co. in the Schuylkill Valley; the Goshen and the Graham stacks in Virginia, and the two Bellaire furnaces of the Carnegie Steel Co. in the

Wheeling district. This reduces the number of possibly active furnaces in the country from 325 to 320.

Furnaces Blown In and Out

During February the following furnaces were blown in: One Palmerton stack of the New Jersey Zinc Co. in the Lehigh Valley; one Worth stack of the Bethlehem Steel Co. in the Schuylkill Valley; the No. 4 Aliquippa stack of the Jones & Laughlin Steel Corporation in the Pittsburgh district; the No. 2 Farrell furnace of the Carnegie Steel Co. in the Shenango Valley; two South Chicago and one Gary furnace of the Illinois Steel Co. in the Chicago district, and one Pioneer stack of the Republic Iron & Steel Co. and one Woodward furnace of the Woodward Iron Co. in Alabama.

The four furnaces blown out or

banked during the month were as follows: One Cambria furnace of the Bethlehem Steel Co. in western Pennsylvania; one Detroit stack of the Hanna Furnace Co. in Michigan; the furnace of the Globe Iron Co. in southern Ohio, and one Ensley stack of the Tennessee Coal, Iron & Railroad Co. in Alabama.

10 Per Cent Better Year Forecast

Forecasting the business trend has been successfully practised for some years by the records of sales of mechanical fans, according to C. A. Booth, Buffalo, vice-president of the National Association of Fan Manufacturers. "Our sales volume," says he, "and a careful checking of this fan or blower index gives us every worthy reason for believing that business generally this year will run at least 10 per cent ahead of 1928." The fan association's survey indicates that there will be considerably more activity in the building of factory plants this year but that activity in other building lines may decline somewhat. Also American exports of many products should establish a new figure this year.

The University of Sheffield (England), is about to open a new department for the cold working of steel. A research fellow and two research scholars are to be appointed to form the nucleus of a staff to assist Sheffield industrial establishments in perfecting the manufacture of cold-worked steel.

Production of Steel Companies for Own Use—Gross Tons
 Total Pig Iron
 Spiegel and Ferromanganese

	Total Pig Iron			Ferromanganese*		
	1927	1928	1929	1927	1928	1929
Jan.	2,343,881	2,155,133	2,651,416	31,844	22,298	28,208
Feb.	2,256,651	2,274,880	2,498,901	24,560	19,320	25,978
2 mos.	4,600,532	4,430,013	5,150,317	56,404	41,618	54,186
Mar.	2,675,417	2,588,153	.....	27,834	27,912	.....
Apr.	2,637,919	2,555,500	.....	24,735	18,405	.....
May	2,619,078	2,652,872	.....	28,734	29,940	.....
June	2,343,409	2,448,905	.....	29,232	32,088	.....
½ year	14,876,355	14,675,448	.....	166,939	149,963	.....
July	2,163,101	2,464,896	.....	26,394	32,909	.....
Aug.	2,213,815	2,561,904	.....	21,279	24,583	.....
Sept.	2,090,200	2,477,695	.....	20,675	22,278	.....
Oct.	2,076,722	2,729,589	.....	17,710	23,939	.....
Nov.	1,938,043	2,654,211	.....	17,851	29,773	.....
Dec.	1,987,652	2,647,863	.....	20,992	28,618	.....
Year	27,345,888	30,211,606	.....	291,840	312,061	.....

*Includes output of merchant furnaces.

Iron and Steel Markets

Output and Demand Expand

Pig Iron Production Rate Rises in February — Railroad Car Orders and Structural Awards Add to Mill Backlogs—Scrap Steadier, Pig Iron Stronger

PIG iron output registered another gain in February, and a net increase of five furnaces in blast on March 1 has brought production to a yearly rate of 42,250,000 tons. Four of the five stacks were steel company units, reflecting the growing pressure for steel mill products.

Steel ingot production of Steel Corporation subsidiaries now averages close to 95 per cent of capacity, and the rate for the industry as a whole lies between 90 and 95 per cent.

Steel demand is broadening. The increasing consumption of the automobile industry is less conspicuous in view of heavier purchases by the railroads, a growing volume of structural steel business, a rise in the requirements of farm implement and machine tool makers and larger demands for pipe lines.

The growing strength of prices is also broadening in scope, as evidenced by another advance in furnace coke in Connellsville and a stiffening of scrap at Pittsburgh, with indications that pig iron and possibly ore may be likewise affected.

Blast furnace returns to THE IRON AGE indicate a February production of 3,206,185 tons of pig iron, compared with 3,442,770 tons in the previous month. Average daily output, however, was 114,507 tons against 110,044 tons in January, a gain of 3.1 per cent. The daily rate was the largest for any February except in 1925 and was the greatest for any month since April, 1926. On March 1 there were 207 furnaces in blast producing 115,770 tons per day, compared with 202 stacks operating at a 111,985-ton rate one month previous.

Railroad buying is featured by orders for 7700 freight cars, requiring 85,000 tons of steel. Nearly 35,000 cars have been purchased by domestic roads since Jan. 1, compared with total orders for 51,200 cars in the entire previous year. New inquiries call for nearly 7000 cars, including 4300 for the New York Central and 2500 for the Erie.

Structural steel lettings, at over 74,000 tons, make the week the largest so far this year. A survey of pending projects requiring 1000 tons or more each discloses 450,000 tons in the East and 375,000 tons in the Middle West likely to be placed before the middle of the year. Fifty barges for the Federal barge line, on which bids will be opened April 8, call for 25,000 tons.

Demands on the mills for pipe line steel are ex-

panding. A Milwaukee maker of electrically welded pipe is now consuming 1200 tons of plates a day, a rate which will be raised to 1500 tons in April. The Standard Oil Co. of New Jersey is about to place orders for 140,000 tons of pipe for a gas line from Monroe, La., to St. Louis, and has ordered 10,000 tons of 8-in. pipe for an oil line. The Texas Corporation is in the market for a 130-mile line, requiring 10,000 tons of 8-in.

Indicative of how steel demand has spread is the increasing market activity in New England, for several years a depressed area. Consumption of mill products in that section is running 20 to 30 per cent ahead of a year ago and is the heaviest since the war.

Furnace welded pipe still stands out as an inactive product, being not only quiet but also more flexible in price. The recent advance of skelp, in sympathy with plates, is not holding.

Advances in the more active products have not been seriously tested, except possibly in the Chicago district. Buyers are heavily committed under current contracts and are more interested in securing shipments than in acting on their future needs. Deliveries of bars, sheets and strip continue to lengthen, with some automobile body sheet mills committed through April and well into May.

Specifications are increasing, and will be further stimulated if mills adhere to a March 15 deadline. Shipping orders at Chicago are the third largest for any week since 1925.

An inquiry from the Ford Motor Co. for 354,000 tons of Lake Superior ore is likely to develop the price for the season, which some producers believe will represent a slight advance.

Furnace coke at Connellsville has advanced to \$3.10 a ton, or 35c. above the price ruling four weeks ago.

The rise in coke, the possibility of higher ore and the fact that pig iron shipments exceed output have caused Valley furnaces to take a stronger stand on prices. Two producers have advanced foundry iron 50c. a ton to \$18, furnace, and another has made a similar change in basic.

Scrap has stiffened at Pittsburgh, following mill purchases of 60,000 tons. At Chicago and St. Louis heavy melting grade has declined 25c. a ton.

THE IRON AGE composite price for pig iron is unchanged at \$18.38 a ton, while finished steel remains at 2.391c. a lb.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	Mar. 5, 1929	Feb. 26, 1929	Feb. 5, 1929	Mar. 6, 1928
No. 2 foundry, Philadelphia...	\$21.26	\$21.26	\$21.26	\$20.76
No. 2, Valley furnace.....	17.50	17.50	17.50	17.25
No. 2, Southern, Cin'ti.....	20.19	20.19	20.19	19.69
No. 2, Birmingham.....	16.50	16.50	16.50	16.00
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.....	20.25	20.25	19.75	19.50
Basic, Valley furnace.....	17.50	17.50	17.50	17.00
Valley Bessemer, del'd P'gh..	20.01	20.01	20.01	19.26
Malleable, Chicago*.....	20.00	20.00	20.00	18.50
Malleable, Valley.....	18.00	18.00	18.00	17.25
Gray forge, Pittsburgh.....	18.76	18.76	18.76	18.51
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace....	105.00	105.00	105.00	100.00

Rails, Billets, Etc., Per Gross Ton:	Mar. 5, 1929	Feb. 26, 1929	Feb. 5, 1929	Mar. 6, 1928
O.-h. rails, heavy, at mill....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Bess. billets, Pittsburgh.....	34.00	34.00	33.00	33.00
O.-h. billets, Pittsburgh.....	34.00	34.00	33.00	33.00
O.-h. sheet bars, P'gh.....	35.00	35.00	34.00	34.00
Forging billets, P'gh.....	39.00	39.00	38.00	38.00
O.-h. billets, Phila.....	39.30	39.30	38.30	38.30
Wire rods, Pittsburgh.....	42.00	42.00	42.00	44.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.85	1.90	1.90	1.85

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.....	2.12	2.12	2.12	2.12
Iron bars, Chicago.....	2.00	2.00	2.00	1.90
Steel bars, Pittsburgh.....	1.90	1.90	1.90	1.85
Steel bars, Chicago.....	2.05	2.05	2.00	1.95
Steel bars, New York.....	2.24	2.24	2.24	2.19
Tank plates, Pittsburgh.....	1.90	1.90	1.90	1.85
Tank plates, Chicago.....	2.05	2.05	2.00	1.95
Tank plates, New York.....	2.17½	2.17½	2.17½	2.17½
Beams, Pittsburgh.....	1.90	1.90	1.90	1.85
Beams, Chicago.....	2.05	2.05	2.00	1.95
Beams, New York.....	2.14½	2.14½	2.14½	2.14½
Steel hoops, Pittsburgh.....	2.10	2.10	2.10	2.20

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Mar. 5, 1929	Feb. 26, 1929	Feb. 5, 1929	Mar. 6, 1928
	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh..	2.85	2.85	2.85	2.90
Sheets, black, No. 24, Chicago				
dist. mill.....	\$3.05	2.95	2.95	3.00
Sheets, galv., No. 24, P'gh..	3.60	3.60	3.60	3.65
Sheets, galv., No. 24, Chicago				
dist. mill.....	3.80	3.70	3.70	3.85
Sheets, blue, 9 and 10, P'gh..	2.10	2.10	2.10	2.10
Sheets, blue, 9 and 10, Chi-				
cago dist. mill.....	2.30	2.20	2.20	2.20
Wire nails, Pittsburgh.....	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill.	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh.....	2.50	2.50	2.50	2.50
Plain wire, Chicago dist. mill.	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh.....	3.30	3.30	3.30	3.35
Barbed wire, galv., Chicago				
dist. mill.....	3.35	3.35	3.35	3.40
Tin plate, 100 lb. box, P'gh..	\$5.35	\$5.35	\$5.35	\$5.25

Old Material, Per Gross Ton:	Mar. 5, 1929	Feb. 26, 1929	Feb. 5, 1929	Mar. 6, 1928
Heavy melting steel, P'gh....	\$18.50	\$18.50	\$18.75	\$14.75
Heavy melting steel, Phila....	16.00	16.00	16.50	13.50
Heavy melting steel, Ch'go....	15.50	15.75	16.00	12.75
Carwheels, Chicago.....	14.50	14.50	14.50	14.00
Carwheels, Philadelphia.....	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh.....	15.00	15.00	15.00	14.50
No. 1 cast, Philadelphia.....	16.50	16.50	16.50	16.00
No. 1 cast, Ch'go (net ton)...	16.00	16.00	16.50	14.50
No. 1 RR. wrot., Phila.....	16.00	16.00	16.00	15.00
No. 1 RR. wrot., Ch'go (net) .	14.00	14.00	14.50	11.00

Coke, Connellsville, Per Net Ton at Oven:	Mar. 5, 1929	Feb. 26, 1929	Feb. 5, 1929	Mar. 6, 1928
Furnace coke, prompt.....	\$3.10	\$3.00	\$2.75	\$2.60
Foundry coke, prompt.....	3.75	3.75	3.75	3.75

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	19.02½	18.37½	17.62½	14.25
Electrolytic copper, refinery..	19.25	18.25	17.25	14.00
Zinc, St. Louis.....	6.35	6.35	6.35	5.50
Zinc, New York.....	6.70	6.70	6.70	5.85
Lead, St. Louis.....	\$7.05	6.90	6.50	5.75
Lead, New York.....	7.10	6.95	6.65	6.00
Tin (Straits), New York....	48.75	48.87½	50.37½	51.62½
Antimony (Asiatic), N. Y....	9.12½	9.37½	9.75	10.25

Pittsburgh

Steady Flow of Steel Orders Maintains Output of 90 Per Cent of Capacity—Pig Iron Prices Show Strength

PITTSBURGH, March 5.—Steel plant operations in the Greater Pittsburgh district are at 90 per cent of capacity. The flow of orders for strips, bars and sheets, reflecting the pressure of the motor car builders for supplies or assurance of protection, is unabated. This being the active production season on rails, that product also is taking a seasonally large amount of crude steel. Tin plate production is heavy and contributes to the demands upon the open-hearth furnaces and Bessemer converters. Railroad business is comparatively good in rolling stock and, while the tonnage of steel going to that use does not tax the capacity of the plate and bar mills, it is adding considerably to current bookings. It is easy to imagine a pretty tight supply situation if there was as much structural steel demand as there was a year ago and the demand for pipe and wire products was brisk.

The situation is not only quiet in tubular goods, but not very steady as to prices. The dullness in these products extends to skelp, which, although nominally advanced with plates a fortnight ago, is not holding and actually is available at 1.85c. Bessemer steel productive capacity is not seriously taxed, and steel mills have both blooming and skelp mill capacity open for engagement. The market will be helped by an order for approxi-

mately 140,000 tons of line pipe for the line and the feeders for the Mississippi Fuel Corporation running from Monroe, La., to St. Louis, which is expected to be closed in the next few days.

No serious test of the higher prices that have been announced in the past few weeks on sheets, strips, bars, plates and shapes has been afforded. The explanation lies in the complete coverage of buyers for this quarter

and the fact that manufacturers have not in all cases resisted the efforts that buyers have made to secure extra coverage following the price change announcements.

Mills still are behind at least a month on hot-rolled strips; on narrow material, delivery promises on new business are even more extended. There is an inside delivery promise on steel bars of two to three weeks. Business in cold-rolled strips lately has tapered somewhat, and better shipments are now offered.

The pig iron market lately has caught some of the stride of the steel market, with more business actually being done and producers talking higher prices in view of higher coke costs and the possibility of an advance in ore prices. Scrap has reversed its recent price tendency under more consumer interest, which has resulted in sales of probably 60,000 tons. Coke has registered a further slight advance, and consumers looking for good furnace fuel lately have not found much available under \$3.10 per net ton at ovens.

Pig Iron.—The pig iron market is not only more active than it has been, but also is beginning to show signs

of gathering strength. Two producers have definitely advanced prices 50c. a ton on foundry iron, and it is expected that others will take a like step when some pending business of size has been closed. A large sanitary ware company has entered the market for a part of its second quarter requirements of No. 2 and No. 2X iron. Producers also are encouraged by the fact that a Uniontown, Pa., radiator company, which more than a month ago asked for prices on approximately 5000 tons of foundry iron and since had shown some inclination to hold off for lower prices, has in the past week placed the order. This business is understood to have gone at \$17.50, Valley furnace, for the base grade, or at an equivalent price. It is probable that the sanitary ware company will be able to close at that price on its requirements, but already there is a quotation of \$18, Valley furnace, and, following a recent purchase of 4000 tons of basic iron by a Pittsburgh district maker of fine steels, one producer has raised its quotation on that grade to \$18. The week's business includes two fair-sized lots of malleable iron, both at \$18, Valley furnace, or the equivalent. Producers are taking a stronger stand on prices because they are shipping more iron than they are producing and also because of the strength of the coke market, which portends some increase in producing costs. Interest of buyers is aroused by the possibility of higher prices. In addition, talk of higher ore prices lends support to an advance on pig iron.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$17.50 to \$18.00
Bessemer	18.25
Gray forge	17.00 to 17.50
No. 2 foundry	17.50 to 18.00
No. 3 foundry	17.00 to 17.50
Malleable	18.00 to 18.50
Low phos., copper free	26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Bars, Plates and Shapes.—Specifications for bars still are heavy. In view of the insistence by mills that final releases on first quarter contracts shall be in by March 15, it is probable that the next 10 days will see a considerable swell in shipping

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Blue ann'd sheets (No. 10), 1 to 10 sheets	3.45c.
Galv. corrug. sheets (No. 28), per square	\$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'd, base per 100 lb.	\$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

orders, which would carry the mills well into April. Makers have yet to fully establish 1.95c., base, as a minimum, chiefly because of a lack of much current demand on account of the full coverage which buyers have for this quarter and the fact that the latter are not yet seriously interested in second quarter requirements. The market is not as active in plates and shapes as it is in bars. Local railroad car shops are better supplied with orders than at any time in a year, and much plate tonnage is embraced in barge orders recently placed or which lately have come up for bids. The Inland Waterways Corporation (Federal Barge Line) will open bids April 8 on 50 barges, for which about 25,000 tons of steel will be required. Structural steel lettings to local shops are few and small. Most of the shipments of plates and shapes are on first quarter contracts.

Wire Products.—February was a very slow month for most makers. While some note improvement in the past few days, the movement into consumption has not yet forced enough

fresh buying and specifying to create general reports of better business. Manufacturers get most satisfaction from the fact that prices are holding in the face of only moderate demand. Fall dating terms have been announced on woven wire fence for shipment South.

Tubular Goods.—Overproduction of oil, which has been followed by agreements to curtail production, has affected the demand for seamless casing, which has shown so much activity since the middle of last year and which with line pipe has supplied the backbone of mill engagement. Lapwelded pipe is particularly dull. In the butt-welded sizes the usual spring activity is slow in developing. Most kinds of tubing are doing well, notably mechanical tubing.

Sheets.—Only a few makers have failed to announce the higher prices on the common finishes. The effect, however, has been to drive in specifications and to stimulate buyers to seek additional coverage at the old prices, the result of which has been merely to give mills larger order books and to provide buyers with protection that will carry them well into the second quarter. The full effectiveness of the advance is thereby delayed until buyers have exhausted present commitments. Most mills are heavily supplied with orders for blue annealed sheets and some are not anxious for more except at 2.20c., base Pittsburgh, but all mills have not yet withdrawn a quotation of 2.10c. The fact that no advance yet has been made on automobile body sheets, makers say, does not necessarily mean that none will be made. Much second quarter body sheet business is to be placed and, as an advance of \$1 a ton on sheet bars will affect the costs of several producers, it is more than likely some attempt at higher prices will be made. Tin mill black plate is firm at 3c.

Tin Plate.—Mill operations continue to indicate expectations of a heavy pack of fruits and vegetables and huge requirements of tin plate.

Cold-Finished Steel Bars and Shafting.—It is a little early for the higher prices announced a fortnight ago to

THE IRON AGE Composite Prices

Finished Steel

March 5, 1929, 2.391c. a Lb.

One week ago	2.391c.
One month ago	2.391c.
One year ago	2.364c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, nails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low	
1928	2.391c.	Dec. 11:	2.314c.	Jan. 3
1927	2.453c.	Jan. 4:	2.293c.	Oct. 25
1926	2.453c.	Jan. 5:	2.408c.	May 18
1925	2.560c.	Jan. 6:	2.396c.	Aug. 18
1924	2.789c.	Jan. 15:	2.460c.	Oct. 14
1923	2.824c.	Apr. 24:	2.446c.	Jan. 2

Pig Iron

March 5, 1929, \$18.38 a Gross Ton

One week ago	\$18.38
One month ago	18.38
One year ago	17.75
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1928	\$18.59,	Nov. 27:	\$17.04,	July 24
1927	19.71,	Jan. 4:	17.54,	Nov. 1
1926	21.54,	Jan. 5:	18.46,	July 13
1925	22.50,	Jan. 13:	18.96,	July 7
1924	22.88,	Feb. 26:	19.21,	Nov. 3
1923	30.86,	Mar. 20:	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
Del'd Philadelphia.....	2.22c. to 2.27c.
Del'd New York.....	2.24c. to 2.29c.
Del'd Cleveland.....	1.95c. to 1.97½c.
F.o.b. Cleveland.....	1.90c. to 2.00c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.00c.
F.o.b. Pittsburgh mills, cut lengths.....	2.25c.
F.o.b. Birmingham, mill lengths.....	2.15c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.85c.
F.o.b. Chicago Heights mill.....	1.95c.

Iron

Common iron, f.o.b. Chicago.....	2.00c. to 2.10c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
Del'd Cleveland.....	2.09c. to 2.14c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.10c.
F.o.b. Sparrow Point.....	2.00c. to 2.10c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
Del'd New York.....	2.17½c. to 2.27½c.
C.i.f. Pacific ports.....	2.20c. to 2.30c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
F.o.b. Bethlehem.....	2.00c. to 2.10c.
Del'd Cleveland.....	2.09c. to 2.14c.
Del'd Philadelphia.....	2.10c. to 2.15c.
Del'd New York.....	2.14½c. to 2.24½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.90c. to 2.00c.
Wider than 6 in., P'gh.....	1.80c. to 1.90c.
6 in. and narrower, Chicago.....	2.10c. to 2.20c.
Wider than 6 in., Chicago.....	2.00c. to 2.10c.
Cooperage stock, P'gh.....	2.10c. to 2.20c.
Cooperage stock, Chicago.....	2.20c. to 2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.30c.
Bars, f.o.b. Chicago.....	2.30c.
Bars, Cleveland.....	2.35c.
Shafting, ground, f.o.b. mill.....	2.65c. to 3.60c.
Strips, P'gh.....	2.85c.
Strips, Cleveland.....	2.85c.
Strips, del'd Chicago.....	3.15c.
Strips, Worcester.....	3.00c. to 3.10c.
Fender stock, No. 20 gage, Pitts- burgh or Cleveland.....	4.25c. to 4.35c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails.....	\$2.65 to \$2.75
Galvanized nails.....	4.65 to 4.75
Galvanized staples.....	3.35 to 3.45
Polished staples.....	3.10 to 3.20
Cement coated nails.....	2.65 to 2.75

Base per 100 Lb.

Bright plain wire, No. 6 to No. 9 gage.....	\$2.50 to \$2.60
Annealed fence wire.....	2.65 to 2.75
Spring wire.....	3.50 to 3.60
Galv'd wire, No. 9.....	3.10 to 3.20
Barbed wire, galv'd.....	3.30 to 3.40
Barbed wire, painted.....	3.05 to 3.15
Woven wire fence (per net ton to retailers).....	65.00
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Bir- mingham mill prices \$3 a ton higher; Worcester Mass., (wire) mill \$3 a ton higher on produc- tion of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.	

Cut Nails

Per 100 Lb.

Carloads, Wheeling, Reading or North- umberland, Pa.	\$2.70
Less carloads, Wheeling or Reading.....	2.80

Sheets

Blue Annealed

	Base per Lb.
Nos. 9 and 10, f.o.b. P'gh.....	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist.....	2.30c.
Nos. 9 and 10, del'd Cleveland.....	2.29c. to 2.39c.
Nos. 9 and 10, del'd Philadelphia.....	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.25c. to 2.35c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.85c. to 2.95c.
No. 24, f.o.b. Chicago dist. mill.....	3.05c.
No. 24, del'd Cleveland.....	3.04c. to 3.14c.
No. 24, del'd Philadelphia.....	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham.....	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh, No. 1 grade.....	4.00c. to 4.10c.
No. 24, f.o.b. P'gh, No. 2 grade.....	3.80c. to 3.90c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.60c. to 3.70c.
No. 24, f.o.b. Chicago dist. mill.....	3.80c.
No. 24, del'd Cleveland.....	3.79c. to 3.89c.
No. 24, del'd Philadelphia.....	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham.....	3.75c. to 3.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.10c.
--------------------------------	--------

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.00c.
-----------------------------------------	--------

Vitreous Enamelling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
--------------------------------	--------

Tin Plate

Standard cokes, f.o.b. P'gh district mills.....	\$5.35
Standard cokes, f.o.b. Gary.....	5.45

Terne Plate

(F.o.b. Morantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$11.20	25-lb. coating I.C. \$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.	Alloy Differential
S.A.E. Series	
Numbers	
2000 (¼% Nickel).....	0.25
2100 (¼% Nickel).....	0.55
2300 (¾% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is ¾c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a \$5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base per 100 Lb.

Spikes, 9/16 in. and larger.....	\$2.80
Spikes, ½ in. and smaller.....	2.80
Spikes, boat and barge.....	3.00
Tie plates, steel.....	2.15

Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	.70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills

Butt Weld

Inches	Steel	Galv.	Inches	Iron	Black	Galv.
1/8.....	45	19½	1/8 and 3/8.....	+11	+36	
1/4 to 3/8.....	51	25½	1/2.....	23	5	
1/2.....	56	42½	3/4.....	28	11	
3/4.....	60	48½	1 and 1½.....	31	15	
1 to 3.....	62	50½	1½ and 2.....	35	18	

Lap Weld

2.....	55	43½	2.....	23	9	
2½ to 6.....	59	47½	2½ to 3½.....	28	13	
7 and 8.....	56	43½	4 to 6.....	30	17	
9 and 10.....	54	42½	7 and 8.....	29	16	
11 and 12.....	53	40½	9 to 12.....	26	11	

Butt Weld, extra strong, plain ends

1/8.....	41	24½	1/8 and 3/8.....	+13	+48	
1/4 to 3/8.....	47	30½	1/2.....	23	7	
1/2.....	53	42½	3/4.....	28	12	
3/4.....	58	48½	1 to 2.....	34	18	
1 to 1½.....	60	49½				
2 to 3.....	61	50½				

Lap Weld, extra strong, plain ends

2.....	58	42½	2.....	29	13	
2½ to 4.....	57	46½	2½ to 4.....	34	20	
4½ to 6.....	56	45½	4½ to 6.....	33	19	
7 to 8.....	52	39½	7 and 8.....	31	17	
9 and 10.....	45	32½	9 to 12.....	21	8	
11 and 12.....	44	31½				

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in.....	40
2½ in.—2¾ in.....	48
3 in.....	54
3½ in.—3¾ in.....	56
4 in.....	59
4½ in. to 6 in.....	48
1½ in.....	1
1¾ in.....	8
2 in.—2¼ in.....	13
2½ in.—2¾ in.....	16
3 in.....	17
3½ in. to 3¾ in.....	18
4 in.....	20
4½ in.....	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:
Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.....	68	3 in.....	48
1½ to 1¾ in.....	55	3½ to 3¾ in.....	50
1¾ in.....	39	4 in.....	53
2 to 2½ in.....	34	4½, 5 and 6 in.....	42
2½ to 3 in.....	42		

Hot Rolled

2 and 2½ in.....	40	3½ to 3¾ in.....	56
2½ and 2¾ in.....	48	4 in.....	59
3 in.....	54	4½, 5 and 6 in.....	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes are gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base (carloads).....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

have become effective, but makers are confident that they will get the advance on second quarter contracts. When the advance was made not a few makers found that fully half of the first quarter contract tonnage had been specified and there has been active releasing of tonnages on contracts since. With final specifications to be in by March 15, producers expect to go into the second quarter with a comparatively small carryover and to clean up first quarter business more promptly than usual.

Hot-Rolled Flats.—Specifications continue to pour in freely and makers now are obligated at least four weeks ahead, and on the narrow widths some are committed for six or seven weeks. There has been very little formal second quarter contracting, but the mills do not need much such business to be able to run full well into April on what they now have together with that which will be driven in by the fact that March 15 is the closing date for first quarter contract specifications.

Cold-Rolled Strips.—Adoption of the new card of extras having become general, yielding higher net prices without the necessity of a higher base price, the market has become clearly defined at 2.85c., base Pittsburgh and Cleveland, for second quarter business. Consumers are drawing against this quarter's contracts, which carry lower net prices and seemingly expect to meet some of their second quarter needs from these commitments, since there has not yet been much second quarter contracting.

Semi-Finished Steel.—Evidence is lacking that the higher prices recently announced on billets, slabs and sheet bars have been done on any considerable tonnage, but it is quite clear that producers have such heavy obligations that they are in a position to decline additional commitments except at the new prices. It is a little early for second quarter contracting. Shipments on this quarter's contracts are heavy in keeping with the large shipments of strips and sheets. Wire rods are not affected in price by the advance in billets, remaining at \$42, base Pittsburgh or Cleveland, for second quarter shipment. Skelp is not holding to the advance that was made when plates were marked up recently. It is now quotable at 1.85c. to 1.90c., and on a round tonnage it is probable that even less than the lower price might be done, since demands for Bessemer steel are moderate on account of the low state of pipe business.

Rails and Track Supplies.—Standard-section rails still are taking a large amount of the current steel production; the movement on 1929 contracts is steady. Light-section rails are doing little. Current business in track supplies is light, but the Pennsylvania Railroad has issued a Clayton law inquiry for its second quarter requirements of tie plates and spikes.

Coke and Coal.—Furnace coke still is very firm in price because the de-

mand, while not quite as heavy in the past few days as it was a week or so ago, still exceeds the supply. It is coke of just fair quality that now is selling at \$3 per net ton at ovens. One lot of 10,000 tons for shipment this month and next was sold at \$3.15 and one or two second quarter contracts recently closed are understood to have gone at slightly above \$3. Spot foundry coke is held more firmly, in keeping with the strong furnace coke market. There is no change of moment in the coal market, but this is the season for annual contracts and a fair number involving good-sized tonnages has been closed at prices no better than lately have prevailed.

Old Material.—Appearance of three steel makers in the market for heavy melting steel and purchases of that grade amounting to at least 60,000 tons have changed the trend of prices, which recently has been downward. One buyer bought a tonnage for one plant in the district at \$18.25 and for another at \$18.75, while the other two buyers are reported to have paid \$18.50. The market thus becomes quotable at \$18.25 to \$18.75, compared with \$18 to \$19 a week ago. Compressed sheets, which were sold about 10 days ago at \$18, have been sold in the past week at \$18.50. Steel foundry scrap has been in stronger demand as a result of improved railroad car business, and railroad knuckles and couplers, springs and rolled steel wheels are 50c. a ton higher. The market is rather soft on machine shop turnings for want of

demand, and blast furnace scrap is off 50c. a ton. Award of the Pennsylvania Railroad March scrap list will not be made until Monday, March 11. The March Baltimore & Ohio list amounts to 10,300 gross tons. The Norfolk & Western March list is about 5000 gross tons.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$18.25 to \$18.75
No. 2 heavy melting steel.....	16.50 to 17.00
Scrap rails.....	17.75 to 18.25
Compressed sheet steel.....	18.00 to 18.50
Bundled sheets, sides and ends.....	16.50 to 17.00
Cast iron carwheels.....	15.25 to 15.75
Sheet bar crops, ordinary.....	18.50 to 19.00
Heavy breakable cast.....	12.75 to 13.25
No. 2 railroad wrought.....	18.25 to 18.75
Hvy. steel axle turnings.....	16.50 to 17.00
Machine shop turnings.....	10.75 to 11.25
Acid Open-Hearth Grades:	
Railr. knuckles and couplers.....	20.50 to 21.00
Railr. coil and leaf springs.....	20.50 to 21.00
Roller steel wheels.....	20.50 to 21.00
Low phos. billet and bloom ends.....	22.00 to 22.50
Low phos., mill plates.....	20.50 to 21.00
Low phos., light grades.....	19.50 to 20.00
Low phos., sheet bar crops.....	20.50 to 21.00
Heavy steel axle turnings.....	16.50 to 17.00
Electric Furnace Grades:	
Low phos. punchings.....	20.00 to 20.50
Hvy. steel axle turnings.....	16.50 to 17.00
Blast Furnace Grades:	
Short shoveling steel turnings.....	12.00 to 12.50
Short mixed borings and turnings.....	12.00 to 12.50
Cast iron borings.....	12.00 to 12.50
Rolling Mill Grades:	
Steel car axles.....	21.00 to 22.00
No. 1 railroad wrought.....	14.50 to 15.00
Sheet bar crops.....	20.50 to 21.00
Cupola Grades:	
No. 1 cast.....	15.00 to 15.50
Rails 3 ft. and under.....	19.50 to 20.00

Detroit Pig Iron Shipments Heavy; Scrap Unchanged

DETROIT, March 5.—No further changes in prices on old material have developed in the past week.

The pig iron melt in the district is on the same basis as during February, with shipments the largest since last March. Melters are covering for pig iron requirements for second quarter on present basis of \$20, furnace.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$14.50 to \$15.00
Borings and short turnings.....	9.25 to 9.75
Long turnings.....	8.00 to 8.50
No. 1 machinery cast.....	14.00 to 15.00
Automobile cast.....	20.00 to 21.00
Hydraul. comp. sheets.....	14.25 to 14.75
Stove plate.....	11.00 to 12.00
No. 1 busheling.....	11.00 to 11.50
Sheet clippings.....	9.00 to 9.50
Flashings.....	12.50 to 13.00

Shipments of Steel Barrels

Supplementing the general figures covered on page 653 of THE IRON AGE for Feb. 28, January shipments of steel barrels by members of the Steel Barrel Manufacturers' Institute are reported at 331,689 units, with unfilled orders at the end of January numbering 455,909. The volume of business during the month was \$1,074,471, and capacity was engaged to the average extent of 48 per cent.

COMING MEETINGS

March

American Society for Testing Materials. March 19 to 22. Committee meetings. Stevens Hotel, Chicago. C. L. Warwick, 1315 Spruce Street, Philadelphia, secretary.

National Association of Waste Material Dealers, Inc. March 19 and 20. Annual meeting, Congress Hotel, Chicago. Charles M. Haskins, Times Building, New York, secretary.

American Society of Mechanical Engineers. March 21 to 23. Regional meeting, Knoxville, Tenn. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

April

Concrete Reinforcing Institute. April 15 to 17. Fifth annual meeting, Kenilworth Inn, Asheville, N. C. M. A. Beeman, 2112 Tribune Tower, Chicago, secretary.

National Metal Trades Association. April 24 and 25. Convention, Hotel Drake, Chicago. J. E. Nyhan, Peoples Gas Building, Chicago, secretary.

American Welding Society. April 24 to 26. Annual meeting, Engineering Societies Building, New York. M. M. Kelly, 33 West Thirty-ninth Street, New York, secretary.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4 in. and under 10 in., Pitts-	
burgh	\$34.00
Rerolling, 4 in. and under 10 in., Youngs-	
town	34.00
Rerolling, 4 in. and under 10 in., Cleve-	
land	35.00
Rerolling, 4 in. and under 10 in., Chicago.	
35.00	
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)	Per Gross Ton
Pittsburgh	\$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)	Per Gross Ton
Pittsburgh	\$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron ore, low phos., copper free, 55 to 58%	
Iron in dry Spanish or Algerian	10.00c.
Iron ore, low phos., Swedish, average 68%	
Iron	10.00c.
Iron ore, basic Swedish, average 65% iron ..	9.00c.
Manganese ore, washed, 52% manganese,	
from the Caucasus	33.00c. to 35.00c.
Manganese ore, Brazilian, African or Indian,	
basic 50%	33.00c. to 35.00c.
Tungsten ore, high grade, per unit, in 60%	
concentrates	\$11.75 to \$12.00
Per Gross Ton	
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f.	
Atlantic seaboard	\$22.00 to \$24.00
Per Lb.	
Molybdenum ore, 85% concentrates of	
MoS ₃ , delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville	
prompt	\$3.00 to \$3.15
Foundry, f.o.b. Connellsville	
prompt	3.75 to 4.85
Foundry, by-product, Ch'go ovens	
Foundry, by-product, New En-	
gland, del'd	11.00
Foundry, by-product, Newark or	
Jersey City, delivered	9.00 to 9.40
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis,	
f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	
9.00	

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa.	
mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa.	
mines	1.50 to 1.75
Gas coal, 1/4-in., f.o.b. Pa. mines ..	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	
1.65 to 1.75	
Steam slack, f.o.b. W. Pa. mines ..	70c. to 75c.
Gas slack, f.o.b. W. Pa. mines ..	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	\$105.00
Foreign, 80%, Atlantic or Gulf port, duty	
paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
	Per Gross Ton Furnace
10%	\$35.00
11%	37.00
12%	\$39.00
14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio Furnace	Per Gross Ton
10%	\$31.00
11%	33.00
	Per Gross Ton
12%	\$35.00

Silvery Iron

F.o.b. Jackson County, Ohio Furnace	Per Gross Ton
6%	\$24.00
7%	25.00
8%	26.00
9%	27.00
	Per Gross Ton
10%	\$29.00
11%	31.00
12%	33.00

Other Ferroalloys

Ferrotungsten, per lb., contained metal	
del'd	98c. to \$1.05
Ferrochromium, 4 to 6% carbon and up, 65	
to 70% Cr., per lb. contained Cr. deliv-	
ered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium,	
f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltitanium, 15 to 18%, per net	
ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace	
material, in carloads, 18%, Rockdale,	
Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. An-	
niston, Ala., per gross ton	\$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride,	
not over 5% silica, gravel, f.o.b. Illinois	
and Kentucky mines	\$18.00
No. 2 lump, Illinois and Kentucky mines ..	20.00
Foreign, 85% calcium fluoride, not over	
5% silica, c.i.f. Atlantic port, duty	
paid	\$18.00 to 19.00
Domestic, No. 1 ground bulk, 95 to 98%	
calcium fluoride, not over 2 1/4% silica,	
f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heat Duty Brick
Pennsylvania ..	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey.....	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton.....	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and	
Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and	
Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces	Per Cent Off List
(F.o.b. Pittsburgh, Cleveland, Birmingham or	
Chicago)	
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square ..	70
Hot-pressed nuts, blank or tapped, hexagons ..	70
C.p.c. and t. square or hex. nuts, blank or	
tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including 1/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E. ..	70
Stove bolts in packages, Pittsburgh ..80, 10 and 5	
Stove bolts in packages, Chicago ..75, 20, 10 and 5	
Stove bolts in packages, Cleveland ..75, 20, 10 and 5	
Stove bolts in bulk, Pittsburgh ..80, 10, 5 and 2 1/2	
Stove bolts in bulk, Chicago ..75, 20, 10, 5 and 2 1/2	
Stove bolts in bulk, Cleveland ..75, 20, 10, 5 and 2 1/2	
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets

(1/2-In. and Larger)	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.90 to \$3.10
F.o.b. Chicago	3.00 to 3.20

Small Rivets

(3/8-In. and Smaller)	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80 and 5
Milled standard set screws, case hardened ..	80 and 5
Milled headless set screws, cut thread ..75 and 10	
Upset hex. head cap screws, U.S.S. thread ..85	
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Three Railroads Order Total of 6650 Cars—Steel Demand Strong—Pig Iron Market Also Active

CHICAGO, March 5.—Three Western railroads, the Chicago, Milwaukee, St. Paul & Pacific, the Texas & Pacific and the Missouri Pacific, have ordered 6650 freight cars, which will require more than 75,000 tons of steel exclusive of wheels and axles. The placing of these orders removes from the Western market much of the large prospective railroad car business. It is probable that the Cotton Belt will enter the market for 1500 cars, and it is reported that the Illinois Central may make additional purchases later in the year. Specifications for car material have assumed larger proportions, but shop schedules consistent with the recent awards are not yet in full swing. Railroad car accessory manufacturers are speeding production and are taking larger quantities of steel.

The closing days of February and the early part of March gave no indication of radical changes in the local iron and steel market. Buyers show more freedom in anticipating forward needs, and sales of plates, bars and shapes are fully up to the average so far this year. Specifications, which are the third largest for any week since 1925, continue to force further extension of delivery dates. Most sizes of plates and bars cannot be had in less than six weeks and in some cases promises are not better than eight weeks. This situation is attracting producers to the east, who can meet buyers' needs more promptly, and therefore competition from that direction is becoming increasingly keen.

Recent price advances are holding, though occasionally there is a disposition for producers to be lenient in the matter of adding tonnages at previous price levels to contracts that have been in force during the first quarter. In some quarters it is not considered improbable that plates, shapes and bars will be advanced \$1 more. Some believe this move is dependent on a stronger attitude in markets east of here.

Pig Iron.—Movement of Northern pig iron is steady and large. Sales are active and there appears to be no change in buyers' interest in future requirements. Local merchant furnaces are operating at capacity. With shipments balancing output, sellers' stocks are stationary. Manufacturers' foundries are in many instances pressed for castings and much work is being passed on to jobbing foundries. It is reported that one broker is offering boat iron for delivery at the opening of navigation at \$19.75, base, delivered Chicago.

Prices per gross ton at Chicago:
N'th'n No. 2 fdy., sil. 1.75 to 2.25...\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75... 20.50
Malleable, not over 2.25 sil. 20.00
High phosphorus 20.00
Lake Super. charcoal, sil. 1.50 27.04
So'th'n No. 2 fdy. (all rail)...\$22.51 to 23.01
Low phos., sil. 1 to 2, copper free... 29.50
Silvery, sil. 8 per cent. 30.79
Bess. ferrosilicon, 14-15 per cent... 46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—In specifications this market is unusually active. New sales,

however, are widely scattered and of car lot proportions. Spiegeleisen is holding at \$34, Hazard, Pa., for carloads of the 19 to 21 per cent grade.

Prices delivered Chicago: 80 per cent ferromanganese, \$112.56; 50 per cent ferrosilicon, \$83.50 to \$88.50; spiegeleisen, 19 to 21 per cent, \$40.76.

Cast Iron Pipe.—The past week was one of the most active in many months. Open weather is responsible for the increased activity in Illinois and neighboring States. Users with tonnages to place see an early resumption of pipe laying, and contractors who still have tonnage to specify on contracts let late last year are anxious to complete old jobs. Prices are firm at \$37 to \$38 a ton, Birmingham, for 6-in. and larger diameters. South Bend, Ind., has ordered 1000 tons from James B. Clow & Sons at \$37, Birmingham, and the United States Cast Iron Pipe & Foundry Co. has taken 500 tons for Rockford, Ill., at the same figure. The American Cast Iron Pipe Co. has been awarded 220 tons by Marshfield, Wis., and 2100 ft. of 2-in. to 8-in. pipe by Wilsonville, Neb. Dearborn, Mich., is reported to have closed for 800 tons with an unnamed bidder. Among fresh inquiries are 1000 tons for St. Paul, Minn., and 300 tons for Stevens Point, Wis. Pipe foundries are speeding output and are still promising reasonably prompt deliveries.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$45.20 to \$46.20; 4-in., \$49.20 to \$50.20; Class A and gas pipe, \$3 extra.

Rails and Track Supplies.—Miscellaneous orders for standard-section rails total 4000 tons. It is significant that these purchases come from railroads that already are under contract for their spring requirements and not from small buyers who are making known their 1929 requirements for the first time. Purchases of track supplies total 4000 tons. Inquiries are small and scattered. The light rail market is dull.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Cold-Finished Steel Bars.—Prices in Chicago are firm at 2.30c. per lb. Second quarter books are open and forward contracting is active. Current

specifications are heavy. Local producers are operating at close to capacity.

Sheets.—Recent advances in prices have served to drive in specifications against old contracts, and producers, who a week ago could arrange schedules for only five or six days, are now scheduled full to the last week in March. Releases are such that all local hot mill capacity could be used. A shortage of steel, however, is being faced and at least one producer will work full time this week to meet the most urgent demands of customers, but in the following week will reduce operations to five days. Forward contracting is promising, though at present the most active buyers are jobbers and the implement trade. Mild weather is bringing larger releases from the roofing trade. Prices are steady at 3.10c. per lb., Chicago, for black sheets, 3.85c. for galvanized and 2.35c. for blue annealed.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Plates.—Two orders for oil storage tanks for delivery in the Southwest and on the Pacific Coast total 9000 tons, and fresh inquiry for similar projects totals 12,000 tons. Specifications are heavy. One pipe maker is now taking about 1200 tons a day and its April schedule calls for 1500 tons a day. Deliveries are not better than six to eight weeks on practically all widths, and there is a feeling among local sellers that plates rolled by mills to the east will soon reach this district in increasing quantities. Railroad equipment business includes 4150 cars ordered by the Chicago, Milwaukee, St. Paul & Pacific, 1500 by the Texas & Pacific and 1000 by the Missouri Pacific. Specifications for car material are a trifle heavier, but still are not consistent with the number of cars that have been purchased in this territory.

Mill prices on plates, per lb.: 2.05c. to 2.15c. base, Chicago.

Bars.—Local soft steel bar mills are producing nearly a record output. Specifications are heavy and deliveries have been pushed ahead to the range of six to eight weeks. Farm implement manufacturers, operating at capacity, are pressing for deliveries to meet their schedules, which are far heavier than had been anticipated earlier in the year. Forge shops are operating nearly at capacity and cold-drawn bar makers are taking larger quantities of bars. Prices remain firm at 2.05c. to 2.15c., Chicago. The opening of second quarter books in iron bars has resulted in few contracts. Current orders from car builders are the largest in several years. Users are freely making commitments for alloy steel bars, to be delivered in the second quarter. Shipments are at mill capacities. Delivery schedules to automobile manufacturers are well arranged for the next

four weeks. The rail steel bar market is quiet. Producers are still asking 1.95c., Chicago Heights, and have made no announcement as to when books will be opened for the second quarter. New buying is dull, while shipments against old orders are sustaining mill operations on a double turn basis.

Structural Material.—The McClintic-Marshall Co. is low bidder at \$786,900 for the fabrication and delivery of 12,000 tons of steel for a court house at Milwaukee. Bids will come before the board of supervisors on March 8. An ordinance is being drafted at East Chicago, Ind., to permit the construction of the Empire Oil & Refining Co.'s refinery, which, it is estimated, will require about 16,000 tons. On the whole, this market is only moderately active.

Mill prices on plain material, per lb.: 2.05c. to 2.15c. base, Chicago.

Reinforcing Bars.—Awards are expanding, the total for the week having been well over 3000 tons. Noteworthy among recent contracts are those placed by Sears, Roebuck & Co. for several merchandising stores. Included in pending business which gives promise of being closed at an early date is 1000 tons for the Damon Avenue bridge, Chicago. Road building contractors are now specifying against large orders placed last fall. Deliveries for road reinforcement may bulk large before the end of March. Prices for billet steel reinforcing bars remain steady at 2.35c. per lb.; Chicago warehouses, in carload lots.

Old Material.—Prices for heavy melting steel have declined 25c. a ton on recent large sales to local steel mills. This tendency on the heavy tonnage grades is having little or no effect on specialties, for which demand is unabated and on which quotations remain at recent high levels. Open weather is bringing more scrap into the market and supplies for immediate shipment are adequate. There exists an oversupply of borings, which are a drug on the market. One consumer of this grade is holding back shipments and another has

sharply cut the number of cars that will be accepted each week. Dealers are offering \$11.25 a gross ton, delivered, for this grade. Brokers are showing less confidence in the market. Many of them point to an expected large flow of scrap, which they argue will tend to depress prices. On the other hand, some sellers believe that the present rate of mill operations, if sustained over the next two or three months, will readily absorb outcoming scrap and that prices will recede little, if any. Foundry grades are active, reflecting an unchanged rate of melt in gray iron, malleable iron and electric furnace plants. Small producers of scrap are loading scrap as fast as it is accumulated.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$15.50 to \$16.00
Shoveling steel.....	15.50 to 16.00
Frogs, switches and guards, cut apart, and misc. rails	16.75 to 17.25
Hydraul. compressed sheets	14.00 to 14.50
Drop forge flashings.....	12.00 to 13.00
Forg'd cast and r'd steel carwheels.....	19.00 to 19.50
Rail'd tires, charg. box size.....	19.00 to 19.50
Rail'd leaf spring cut apart.....	19.00 to 19.50

Acid Open-Hearth Grades:	
Steel couplers and knuckles	17.00 to 17.50
Coil springs.....	19.50 to 20.00

Electric Furnace Grades:	
Axle turnings.....	15.75 to 16.25
Low phos. punchings.....	17.50 to 18.00
Low phos. plate, 12 in. and under.....	17.50 to 18.00

Blast Furnace Grades:	
Axle turnings.....	11.75 to 12.25
Cast iron borings.....	11.00 to 11.50
Short shoveling turnings.....	11.00 to 11.50
Machine shop turnings.....	8.00 to 8.50

Rolling Mill Grades:	
Iron rails.....	16.00 to 16.50
Rerolling rails.....	17.50 to 18.00

Cupola Grades:	
Steel rails less than 3 ft..	18.75 to 19.25
Steel rails less than 2 ft..	19.50 to 20.00
Angle bars, steel.....	17.50 to 18.00
Cast iron carwheels.....	14.50 to 15.00

Malleable Grades:	
Railroad.....	19.00 to 19.50
Agricultural.....	16.50 to 17.00

Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angles and splice bars	15.00 to 15.50
Iron arch bars and transoms.....	21.25 to 21.75
Iron car axles.....	27.50 to 28.00
Steel car axles.....	17.50 to 18.00
No. 1 railroad wrought.....	14.00 to 14.50
No. 2 railroad wrought.....	13.75 to 14.25
No. 1 busheling.....	12.00 to 12.50
No. 2 busheling.....	7.00 to 7.50
Locomotive tires, smooth.....	14.50 to 15.00
Pipes and flues.....	9.50 to 10.00

Cupola Grades:	
No. 1 machinery cast.....	16.00 to 16.50
No. 1 railroad cast.....	15.50 to 16.00
No. 1 agricultural cast.....	14.50 to 15.00
Stove plate.....	12.75 to 13.25
Grate bars.....	13.50 to 14.00
Brake shoes.....	12.50 to 13.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Bolts, Nuts and Rivets.—Sellers have started to place before outlying buyers contracts for the second quarter. Prices remain at previous levels, with large rivets commanding \$3.20 per 100 lb. Users are specifying at a uniform rate.

Coke.—By-product foundry coke

shipments are making records in spite of the fact that the need for heating fuel is past. Prices remain firm at \$8, f.o.b. local ovens.

Wire Products.—Forward contracting has assumed sizable proportions from the manufacturing trade, but jobbers, hindered in distribution by unfavorable weather, are hesitant in making commitments for the spring. Many manufacturers underestimated their first quarter requirements and some contracts for this period have been specified in full. There is little to show that manufacturers have accumulated stocks, while, on the other hand, it is quite evident that jobbers now have a sufficient tonnage to meet their early spring needs. Demand for nails is light, and woven wire fencing is moving only in small quantities. Mill stocks have grown measurably heavier in nails, concrete reinforcement and field fencing.

Cold-Rolled Strips.—Users are specifying more liberally, and mills now have well arranged schedules for at least four weeks. Consideration is being given to naming April 15 as the deadline for shipments against current contracts. Forward buying is light. Some users are raising objections to the new card of extras.

Penn State College Appoints Steel Advisory Board

Fourteen leaders in the iron and steel industries of Pennsylvania have been appointed to form a metallurgical advisory board for the School of Mines and Metallurgy at Pennsylvania State College. The board will assist in working out various problems so that the college may better serve the iron and steel industries of the State.

Following are the members: F. D. Andrews, general superintendent Harrisburg Pipe & Pipe Bending Co., Harrisburg; L. R. Custer, general manager Cambria works, Bethlehem Steel Co., Johnstown; A. N. Diehl, vice-president Carnegie Steel Co., Pittsburgh; Dr. H. L. Frevert, vice-president in charge of operations, The Midvale Co., Nicetown, Philadelphia; T. M. Girdler, president Jones & Laughlin Steel Corporation, Pittsburgh; C. W. Heppenstall, president Heppenstall Forge & Knife Co., Pittsburgh; Dr. C. H. Herty, Jr., supervising metallurgist Bureau of Mines Experiment Station, Pittsburgh; Roy C. McKenna, president Vanadium-Alloys Steel Co., Latrobe; E. J. Poole, vice-president and general manager Carpenter Steel Co., Reading; O. C. Skinner, works manager Standard Steel Works Co., Burnham; H. C. Thomas, vice-president the Alan Wood Co., Philadelphia; F. M. Waring, engineer of tests, Pennsylvania Railroad, Altoona; Charles A. Waters, secretary of labor and industry, Harrisburg; and Dr. H. W. Gillett, chief division of metallurgy, Bureau of Standards, Washington, D. C.

Warehouse Prices, f.o.b. Chicago

Base per Lb.

Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel.....	2.35c.
Reinforc'g bars, rail steel.....	2.05c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Plats and squares.....	4.10c.
Bands (½ in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter).....	3.75c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.65c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes, stand. railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.80c.
Rivets, boiler.....	3.80c.

Per Cent Off List

Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, sq., tap. or blank.....	60
Hot-pressed nuts, hex., tap. or blank.....	60
No. 8 black ann'd wire, per 100 lb.....	\$3.30
Com. wire nails, base per keg.....	3.20
Cement c'd nails, base per keg.....	3.20

Philadelphia

Buying Limited to Small Lots—Shape Prices Still Irregular —Scrap Prices More Stable

PHILADELPHIA, March 5.—The recently announced advances of \$1 a ton on plates, shapes and bars and \$2 a ton on sheets are untested in the absence of contracting for second quarter. Although mills seem confident that the increase of \$1 a ton will be maintained on bars and plates, quotations on shapes continue rather irregular, covering a wide range, dependent upon the customer and the size of the order. Mills are well engaged, maintaining operations of 75 to 85 per cent of capacity, but fairly early delivery is obtainable on most products. The advance of \$1 a ton on billets is not effective on sales for prompt delivery, but sellers are quoting the higher level for second quarter contracts. The Pennsylvania Railroad has not yet asked for prices on its usual quarterly requirements for plates, shapes, bars and sheets, but will open bids March 12 on a tonnage of tie plates and 16,500 kegs of spikes for the second quarter.

Pig Iron.—Inquiry for foundry iron for second quarter delivery is increasing, but the tonnage under contract is small. Most of the current buying is at \$21 per ton, furnace, but some sellers are evidently still willing to accept desirable lots at 50c. per ton less. The Baldwin Locomotive Works, Eddystone, Pa., has closed for 1500 tons of cylinder iron, and the business is reported to have gone to a New York State furnace. Users of basic iron in eastern Pennsylvania have covered their requirements for the present. Low phosphorus iron is quiet and prices are unchanged. An importer of Indian foundry iron states that no more shipments will arrive until May.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$21.26 to \$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. 1X, 2.25 to 2.75 sil.	22.26 to 22.76
Basic (del'd east. Pa.), 2.25 to 2.75 sil.	20.25 to 20.50
Gray forge, 2.25 to 2.75 sil.	20.50 to 21.00
Malleable, 2.25 to 2.75 sil.	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace), 2.25 to 2.75 sil.	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace), 2.25 to 2.75 sil.	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	25.29
Va. No. 2X, 2.25 to 2.75 sil.	25.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Billets.—Although an advance of \$1 a ton to \$34, Pittsburgh, for rerolling grade and \$39, Pittsburgh, for forging billets, has been announced for the second quarter, mills are still quoting the former level on small tonnages for prompt shipment. A test of the new price is expected when present contracts are renewed later this month.

Bars.—New bar business is small and contracting for second quarter has not yet begun. Mills are quoting 1.95c., Pittsburgh, or 2.27c., Philadelphia, on current purchases of small lots and as the minimum for second quarter contracts.

Shapes.—Prices continue irregular, with desirable tonnages bringing out quotations of 1.95c., f.o.b. nearest mill to consumer, or 2.01c., Philadelphia, while small lots for prompt shipment are quoted at 2.05c. and 2.10c., f.o.b. nearest mill to consumer, or 2.11c. to 2.16c., delivered Philadelphia. Mills believe that the recently announced

advance of \$1 a ton for second quarter will serve to render the market a little firmer, but an advance to a minimum of 2.05c., f.o.b. mill, in line with other products, is not expected. Fabricated steel prices continue low on large projects.

Plates.—Mill operations are being maintained at 75 to 85 per cent in most cases. The new second quarter price of 2.05c., Coatesville, or 2.15c., Philadelphia, is being quoted on small lots for early delivery.

Sheets.—Blue annealed sheets are fairly firm at 2.10c. to 2.20c. per lb., Pittsburgh. Black and galvanized sheets are quoted at 2.95c., Pittsburgh, or 3.27c., Philadelphia, for black and 3.70c., Pittsburgh, or 4.02c., Philadelphia, for galvanized, but contracts have not yet been made at the new prices. With both black and galvanized sheets showing an undertone of weakness prior to the announcement of an increase of \$2 a ton, there seems to be hesitation among buyers in accepting the new prices.

Warehouse Business.—Advances of \$2 a ton have been made by jobbers on black, galvanized and blue annealed sheets and on cold finished steel bars, reflecting similar increases recently announced by the mills. Although the total volume of business in February was smaller than that of Jan-

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.40c.
Steel bands, No. 12 to ⅞-in., incl.	3.15c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.25c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

uary, because of the shortness of the month, buying was active, especially in the final week.

Imports.—In the week ended March 2 a total of 2000 tons of chrome ore arrived at this port from Portuguese Africa, 701 tons of pig iron from British India and 150 tons of spiegel-eisen from the United Kingdom. Steel imports consisted of 455 tons of structural shapes, 112 tons of steel bars and 1 ton of hoops, all from Belgium, and 7 tons of steel scrap from the United Kingdom.

Old Material.—Buying of iron and steel scrap by consumers has been limited to small tonnages. No sales of No. 1 heavy melting steel are reported. The downward trend of prices has been checked. In most cases prices are substantially unchanged. An exception is heavy breakable cast scrap, which has been sold at \$15.50 and \$15.75 per ton, delivered to eastern Pennsylvania consumers. An eastern Pennsylvania mill, which has been buying all its scrap requirements through an appointed dealer, has terminated the arrangement for the present, and has bought a tonnage of machine shop turnings in the open market at \$11.50 per ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$16.00 to \$16.50
Scrap T rails	15.50 to 16.00
No. 2 heavy melting steel	12.25 to 13.00
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.00 to 11.50
Hydraulic compressed, new	14.50 to 15.50
Hydraulic compressed, old	13.00 to 13.50
Machine shop turnings (for steel works)	11.00 to 11.50
Heavy axle turnings (or equiv.)	13.50 to 14.00
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.50 to 13.00
Stove plate (for steel works)	12.50 to 13.00
No. 1 low phos., hvy., 0.04% and under	20.00 to 21.00
Couplers and knuckles	19.00 to 19.50
Roller steel wheels	18.50
No. 1 blast f'nace scrap	10.00 to 10.50
Wrot. iron and soft steel pipes and tubes (new specific.)	15.50
Shafting	18.50 to 19.00
Steel axles	22.00 to 23.00
No. 1 forge fire	13.00 to 14.00
Cast iron carwheels	16.50
No. 1 cast	16.50
Cast borings (for chem. plant)	15.00
Steel rails for rolling	17.00 to 17.50

Better Utilization of Fuel in Power Plants

Continuation of the steady improvement of the past several years in the utilization of fuels in producing power is reported by the United States Geological Survey. The total of fuel-generated electricity was 5.5 per cent greater in 1928 than in 1927. But the amount of fuel consumption showed an increase of only 1.1 per cent. Reduced to the coal basis, the average rate of fuel consumption was 1.76 lb. for each kw-hr., compared with 1.84 lb. in 1927 and larger amounts in earlier years. This small saving in one year represents the equivalent of about 2,120,000 tons of coal, valued at about \$8,000,000.

New York

Pig Iron Sales Increase to 18,000 Tons—Line Pipe Inquiries Feature Steel Market

NEW YORK, March 5.—Pig iron sales, at about 18,000 tons, were the largest for any week since the first of the year, and inquiry is expanding. Prices show little change. Eastern Pennsylvania foundry iron is quoted at \$19.50, base furnace, and Buffalo foundry iron is bringing \$17 to \$17.50, base furnace, with the minimum figure shaded in some instances. Buffalo producers are said to have accumulated good-sized second quarter bookings, and are reported to be considering an advance in quotations. Shipments of pig iron in February were larger than in January, and the total for the two months showed a substantial gain over that for the corresponding period last year. Pressure for deliveries is unabated, indicating sustained melt. Some melters in a position to take water deliveries are deferring purchases until barge rates are fixed for the coming season. The quoted rate from Buffalo to New York harbor is likely to be \$2 a ton, or about the same as a year ago. In one or two instances last year, however, shippers succeeded in obtaining a rate of \$1.50. The Worthington Pump & Machinery Corporation, New York, has closed against its inquiry for 3900 tons for various plants, and the General Electric Co. has bought about 3000 tons for a number of plants. The Richmond Radiator Co., New York, has closed against a substantial part of its inquiry for 5000 tons for Uniontown, Pa. The Thatcher Co. will take action shortly on 500 tons of No. 2X for Newark, N. J., and 1000 tons of No. 2 plain for Garwood, N. J. Another current inquiry calls for 1000 tons of foundry for second quarter delivery.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25.....	\$21.91 to \$22.41
•Buf. No. 2, del'd east. N. J.	20.28 to 20.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	20.89 to 22.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	21.39 to 22.52
East. Pa. No. 1X fdy., sil. 2.75 to 3.25.....	21.89 to 23.02

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Price delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Ferroalloys.—There have been sales of small lots of spiegeleisen at prevailing prices. The leading domestic producer blew in its second furnace on this alloy the third week in February and another producer is operating a spiegeleisen furnace in western Pennsylvania. Supplies are expected to be more ample in the near future. Now and then sales of the foreign alloy are reported. Demand for ferromanganese is very light, but specifications on contracts for this and other alloys are very large.

Plates, Shapes and Bars.—A number of steel bar contracts for second

quarter have been written up at 1.95c., Pittsburgh, but otherwise the new price has not been tested except on some small lots not covered by contract. Eastern plate mills have authorized local selling offices to enter second quarter contracts at 2.05c., Coatesville, but buyers are not yet interested, and, in fact, are specifying in reduced volume on their present contracts. For delivery during March some mills will still accept plate business at 2c., Coatesville. In shapes the situation is fairly firm in anticipation of a continued high rate of building construction, but second quarter buying is being deferred. Meanwhile, protections on pending work at the old prices are in some instances being held open. In general, the volume of business is good, and those mills which insist on specifications on first quarter contracts by March 15 expect a large volume of shipping orders during the next week or 10 days.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c. to 2.29c.; plates, 2.17½c. to 2.22½c.; struc. shapes, 2.14c. to 2.19½c.; bar iron, 2.14c.

Pipe.—The Standard Oil Co. of New Jersey is expected to place orders shortly for about 100,000 tons of 22-in. pipe for a gas line to extend from Monroe, La., to St. Louis. This company has inquired for 30,000 to 40,000 tons of 2 to 16-in. pipe for feeder lines for this project, and has recently ordered 10,000 tons of 8-in. pipe for an oil line. The Texas Corporation is in the market for a 130-mile line requiring about 10,000 tons of 8-in. pipe. The demand for pipe used in building construction is showing a slight improvement.

Cast Iron Pipe.—Prices still show some irregularity, depending upon the size of the tonnage. Delivered prices of Southern foundries continue at \$2 to \$3 per ton higher than the quotations of Northern makers of pressure pipe. Bloomfield, N. J., has opened bids on 400 tons of 6 to 12-in. Class C water pipe, on which the Herbert Kennedy Co. was low, offering French cast iron pipe. Norwood, Mass., has opened bids on 200 tons of 6 and 8-in. Class B pipe and fittings. Rockville Center, L. I., is in the market for 150 tons of 24-in. Class A pipe and fittings for a proposed new sewer system. Buying by private companies is small and no large municipal purchases are reported in prospect for the next few weeks.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$38.60 to \$40.60; 4-in. and 5-in., \$43.60 to \$45.60; 3-in., \$53.60 to \$55.60. Class A and gas pipe, \$3 extra.

Fabricated Structural Steel.—The volume of lettings shows little improvement, but pending work continues to pile up, with the prospect of considerable activity during the

spring months. The Structural Steel Board of Trade of New York reports awards of 24,000 tons, exclusive of bridges, subway work, etc., during February in the metropolitan district, compared with 27,600 tons in the previous month and with 24,850 tons in February, 1928. Bids will be taken on March 15 on a section of the subway in Brooklyn, which calls for 8000 tons. An unusually large tonnage of

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal..	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Cold-roll. strip, soft and quarter hard.....	5.15c. to 5.40c.
Hoops.....	4.25c.
Bands.....	3.75c.
Blue ann'd sheets (No. 10).....	3.85c. to 3.90c.
Long terne sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, 1½ x ½ in. and larger..	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.65c.
Open-hearth spring steel, bases, 4.50c. to 7.00c.	
Machine bolts, cut thread:	Per Cent Off List
¾ x 6 in. and smaller.....	.60
1 x 30 in. and smaller..	.50 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	.60
¾ x 20 in. and smaller..	.50 to 50 and 10
Coach screws:	
¾ x 6 in. and smaller.....	.60
1 x 16 in. and smaller..	.50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
¼-in. butt.....	46	29
¾-in. butt.....	51	37
1-3-in. butt.....	53	39
2½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12
Wrought Iron—		
¼-in. butt.....	5	+19
¾-in. butt.....	11	+9
1-1½-in. butt.....	14	+6
2-in. lap.....	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box...	\$6.45	\$6.20
Charcoal, per Box—	A	AAA
IC.....	\$9.70	\$12.10
IX.....	12.00	14.25
IXX.....	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R.

	One Pass	Per Lb.
Nos. 13 to 20.....		3.80c.
No. 22.....		3.95c.
No. 24.....		4.00c.
No. 26.....		4.10c.
No. 28*.....		4.25c.
No. 20.....		4.50c.

Sheets, Galvanized

	Per Lb.
No. 14.....	4.40c.
No. 16.....	4.25c.
No. 18.....	4.40c.
No. 20.....	4.50c.
No. 22.....	4.60c.
No. 24.....	4.75c.
No. 26.....	5.00c.
No. 28*.....	5.25c.
No. 30.....	5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

subway work is outstanding, and will probably be placed this month. A survey of important projects in the East which will require 1000 tons or more indicates that at least 450,000 tons of structural material is likely to be closed before the middle of the year.

Reinforcing Steel.—Business is confined mostly to small tonnages, and although their number is satisfactory, the volume is not up to expectations at this time of the year. The P. T. Cox Contracting Co. and the Arthur McMullen Co. are low bidders on two sections of the Kill Van Kull bridge at Bayonne, N. J., which require about 550 tons. Local distributors are busy on estimates of pending work which is soon expected to come out for bids and there is an unusually large number of school buildings in Westchester County and Long Island upon which early action is expected. Prices are unchanged.

Warehouse Business.—Cold-finished shafting and screw stock has been advanced \$2 a ton to 3.60c. per lb. for rounds and hexagons and 4.10c. per lb. for flats and squares. Buying from stock is in fair volume. With spring approaching, demand for structural material is beginning to increase. Business in sheets continues light, but prices are unchanged and fairly well maintained.

Coke.—Standard furnace coke continues firm at \$3 to \$3.25 per ton, Connellsville. Buyers expect a slight decline in a few weeks, when the winter demand for heating coke diminishes. Standard foundry is inactive and not particularly strong at \$3.50 to \$3.75 per ton, Connellsville. Special brands of foundry coke are unchanged at \$4.85 per net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn. By-product coke is quoted at \$9 to \$9.40

per net ton, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Old Material.—Prices of most grades are beginning to show slightly more stability, although there has been little consumer buying in the past week. No. 1 heavy melting steel is quoted at \$16.25 per ton, delivered to consumers at Coatesville, Pa., and Claymont, Del., and \$15.50 per ton, delivered to Bethlehem, Pa. Following the sale of a tonnage of machine shop turnings at \$11.50 per ton to a Phoenixville, Pa., mill, brokers are offering \$11 and \$11.25 per ton for this delivery. Buying prices on blast furnace scrap are slightly weaker, with \$9 per ton offered for delivery to Bethlehem, Pa., and \$10 per ton, delivered to Conshohocken, Pa. Yard grade of heavy melting steel is quoted by brokers at \$11.75 per ton, delivered to a mill at Pottsville, Pa., and \$13 per ton, delivered to Phoenixville, Pa. Heavy breakable cast scrap is off slightly, following sales at \$15.50, delivered, to eastern Pennsylvania and to a consumer at Florence, N. J.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$12.50 to \$12.85
Heavy melting steel (yard)	8.50 to 9.50
No. 1 hvy. breakable cast	11.75 to 12.00
Stove plate (steel works)	8.75 to 9.00
Locomotive grate bars	8.75 to 9.00
Machine shop turnings	7.50 to 7.75
Short shoveling turnings	7.50 to 8.00
Cast borings (blast furn. or steel works)	7.00 to 7.25
Mixed borings and turnings	6.25 to 6.50
Steel car axles	18.25 to 18.75
Iron car axles	24.50 to 25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	11.75
Forge fire	10.00 to 10.50
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought, long	11.50 to 12.00
Rails for rolling	13.50 to 13.75
Cast iron car wheels	12.50 to 12.75
Stove plate (foundry)	9.50
Malleable cast (railroad)	13.00 to 14.00
Cast borings (chemical)	11.50
<i>Prices per gross ton, deliv'd local foundries:</i>	
No. 1 machry. Cast	\$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	15.00
No. 2 cast (radiators, cast boilers, etc.)	14.50

the Michigan territory have increased production this month and mills are being hard pressed for deliveries from this source.

On structural shapes and plates, deliveries in two to three weeks can be secured. Demand for plates, which has been slow, has gained. Locomotive orders have brought considerable plate business to a Cleveland mill. Lake shipyards have an inquiry for a barge requiring 300 to 400 tons of plates.

Pig Iron.—The market continues quite active. Sales of 36,000 tons in foundry and malleable grades were made by Cleveland interests during the week. There was considerable buying in Michigan and Indiana and in the Buffalo territory. A Kokomo, Ind., consumer bought 1000 tons of foundry iron. The General Electric Co. is inquiring for its Erie, Pa., works, and an inquiry for 3000 tons is pending. An Ohio foundry is inquiring for 1000 to 2000 tons of malleable. One Valley producer has advanced foundry iron 50c. a ton to \$18, furnace, but others are still quoting \$17.50. Lake furnace prices are unchanged. Local furnaces quote foundry and malleable iron at \$18.50 for outside shipment, and another producer is holding to \$19. In Michigan, \$20 is the ruling price. February shipments with some furnaces broke all records for the month. Automotive foundries continue to take a large amount of iron and several of the important foundries in this field in the Michigan territory are reported to be increasing production this month.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., 1.75 to 2.25	\$22.50 to 23.00
Malleable	19.50
Ohio silvery, 8 per cent.	29.00
Basic Valley furnace	17.50
Stand. low phos., Valley	26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Iron Ore.—The Ford Motor Co., Detroit, has sent out an inquiry for 354,000 tons of Lake Superior ore for 1929 delivery and has set March 20 as the date for receiving bids. This compares with an inquiry by the Ford company last year for 443,000 tons, which was about the amount of its purchases to supplement ore produced in its own mines. The Ford inquiry is for 200,000 tons of basic ore, 77,000 tons of manganese, 33,000 tons of silicious and 44,000 tons of high phos-

Cleveland

Recent Price Advances Not Yet Tested—Steel Demand Heavy, Particularly From Automobile Industry

CLEVELAND, March 5.—The recent price advances on most steel products have as yet been given little test. Consumers of steel bars, plates and structural shapes are showing some hesitation in placing second quarter contracts, evidently waiting to see whether the market becomes established at the \$1 a ton advance, or 1.95c, Pittsburgh. While small lots have been sold at the advance, some of the mills are still taking current orders at 1.90c., and it is a question whether the rule that specifications against 1.90c. first quarter contracts be in by March 15 will be strictly enforced. Mills are not yet making much effort to close contracts for the second quarter, nor are consumers of the heavier products showing much interest in contracts.

Large consumers in the automotive field are displaying anxiety to get under cover for the second quarter for sheets and hot and cold-rolled strip steel, on which deliveries are well extended, but are offering resistance to the price advances. While higher prices are awaiting the market test, makers of alloy steel bars have announced the reestablishment of present prices for the second quarter.

Specifications for finished steel continue to come out in heavy volume and deliveries have become more extended on some lines. On steel bars, mills are now promising shipments in not less than three to five weeks. Some of the mills are getting further behind on auto body sheets and strip steel, but others are keeping production about equal to incoming orders. Some of the automobile companies in

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 14 in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	5.95c.
Black sheets (No. 24)	3.50c.
Galvanized sheets (No. 24)	4.45c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	\$2.95
No. 9 gal. wire, per 100 lb.	3.40
Com. wire nails, base per keg	2.95

*Net base, including boxing and cutting to length.

phorus ore. Last year its inquiry was for 286,000 tons of basic ore, 66,000 tons each of manganese and high phosphorus and 25,000 tons of silicious. The Ford company, the largest buyer of merchant ore, has been for several years the first to send out an inquiry for a sizable tonnage and several times, including last year, the market price has been established by sales to that company. Some producers believe that conditions warrant a slight price advance this year.

Semi-Finished Steel.—The demand, particularly for sheet bars, continues very heavy, and some consumers are short of steel. The leading local producer, operating at 100 per cent of capacity, is now three weeks behind on deliveries. With the \$1 a ton advance in prices, this company states that all the tonnage on contracts not specified by April 1 will be cancelled. Consumers, it is expected, will begin placing second quarter contracts this week.

Alloy Steel Bars.—The present base of 2.65c., mill, has been reestablished for the second quarter and mills are starting to take business for that delivery. This base applies to regular buyers and to large users. Small-lot consumers will be charged 2.75c., base, as at present. Incoming orders are sufficient to keep mills operating at capacity.

Bolts, Nuts and Rivets.—The present discount of 70 per cent off list for bolts and nuts has been reestablished for the second quarter by some makers and others will doubtless follow suit. March has started with a large amount of business and the industry is operating at 75 to 80 per cent of capacity. The automotive industry is ordering in heavy volume.

Spikes.—The present price of 2.80c., mill, on large spikes has been reaffirmed for the second quarter.

Coke.—Ohio by-product foundry coke has been advanced 50c. a ton to \$8.25, Painesville, for March shipment. Connellsville foundry coke is unchanged in price, but the supply is not plentiful because of the shutting down of ovens, due to the diversion of coal to the domestic trade. Mild weather has resulted in an easier situation in respect to by-product coke for domestic use.

Sheets.—There is no slackening in the heavy demand, and deliveries are becoming more extended, particularly on auto body sheets, for which some mills are fully engaged until June. There has been virtually no contracting for second quarter, so the advanced prices are untested, although these are being generally quoted. There is considerable pressure for deliveries, and consumers are more interested in getting shipments than in prices. Galvanized sheets, which are in light demand, are still being offered at 3.60c., Pittsburgh. One leading producer, which recently advanced tin mill black plate \$2 a ton, has restored the old price of 3c. because the advance was not generally followed. An-

other producer is still holding to 3.10c.

Strip Steel.—While contracts for hot and cold-rolled strip for the second quarter have been closed by some of the smaller consumers, there has not been much of a test of the advanced prices for that delivery. A Cleveland mill is quoting the new prices, but has not opened its books for the coming quarter. With the new extras in effect, mills may meet some resistance from large buyers to the 2.85c. price on cold-rolled strip. Specifications are very heavy for both materials, and most mills are making from four to six weeks' delivery promises.

Cold-Finished Steel Bars.—Specifications against contracts are large, but consumers are showing no interest in second quarter contracts and the \$2 a ton price advance has not been tested except on a limited amount of small lot business.

Wire Products.—Consumers still have some material due on old low-priced contracts, and orders that are being taken at the present quotations are limited to small lots. The reestablishment of present prices for the second quarter has not been followed by contracting for that delivery.

Reinforcing Bars.—The Jones & Laughlin Steel Corporation has taken 1500 tons for Cleveland Union Terminals work. New inquiry is light. The 2.44c. Cleveland warehouse price is being well maintained for small lots.

Warehouse Business.—Jobbers' sales in February showed a gain over those of January, and the volume at present is good, being stimulated by extended mill deliveries. No irregularity in prices is reported.

Commonwealth Steel Has Large Expansion Plans

The Commonwealth Steel Co., Granite City, Ill., will spend more than \$1,000,000 in expanding buildings and equipment during 1929, it is announced by George C. Smith, director of the Industrial Bureau of the Industrial Club of St. Louis. The first project to be undertaken is the erection of an addition, 100 x 400 ft., to the department for finishing locomotive beds and other large castings. Contract for the building has been let and additional machinery purchased.

Blaw-Knox Co. is Merged with Chicago Company

The Blaw-Knox Co., Pittsburgh, manufacturer of steel building products and equipment, and A. W. French & Co., Chicago, maker of road finishing machinery, graders, etc., have been merged. The personnel and policies of the French company will continue as heretofore and its plant and sales organization will function as a separate division of the Blaw-Knox Co.

Old Material.—The market is moderately active in trading between dealers, but no purchases by consumers were reported during the week. Dealers are paying \$17.50 for No. 1 railroad heavy melting steel and the quotations that appear below for other grades. There is a scarcity of No. 2 heavy melting steel and no surplus of other heavier grades of steel making scrap. Blast furnace scrap is plentiful, and the market does not show the strength on these grades as on steel making scrap. However, some of the dealers have short orders and this, with the heavy operation by steel mills, is tending to maintain recent prices.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades		
No. 1 heavy melting steel	\$15.50 to	\$16.00
No. 2 heavy melting steel	15.00 to	15.50
Compressed sheet steel	15.00 to	15.50
Light bundled sheet		
stamp'gs	12.00 to	12.50
Drop forge flashings	13.00 to	13.25
Machine shop turnings	10.75 to	11.00
No. 1 railroad wrought	13.25 to	13.50
No. 2 railroad wrought	16.00 to	16.50
No. 1 busheling	12.50 to	13.00
Pipes and flues	9.00 to	9.50
Steel axle turnings	12.50 to	13.00

Acid Open-Hearth Grades		
Low phos. forging crops	19.00 to	19.50
Low phos., billet, bloom		
and slab crops	18.50 to	19.00
Low phos. sheet bar crops	18.00 to	18.50
Low phos. plate scrap	18.00 to	18.50

Blast Furnace Grades		
Cast iron borings	11.50 to	11.75
Mixed bor'g and short		
turn'gs	11.50 to	11.75
No. 2 busheling	11.50 to	11.75

Cupola Grades		
No. 1 cast	16.50 to	17.00
Railroad grate bars	11.00 to	12.00
Stove plate	12.00 to	12.50
Rails under 3 ft.	16.75 to	17.25

Miscellaneous		
Railroad malleable	16.00 to	16.50
Rails for rolling	16.25 to	16.50

Rust-Resisting Alloy to Be Used for 1000 Freight Cars

Rust-resisting alloy will be used for the sides and floors of 1000 gondola cars recently purchased by the Wheeling & Lake Erie Railroad from the Standard Steel Car Co., this material having been specified to increase efficiency and lower operating costs by decreasing the weight of the cars. The general practice in building gondola cars, it is stated, is to use plates somewhat heavier than actually required to allow for loss in thickness by corrosion during the life of the car, but by the use of rust-resisting metal plates of a lighter gage can be used without any reduction in the strength of the car.

The cars of 70-ton capacity will weigh approximately 25 tons each when empty, or slightly more than one ton per car less than if ordinary plates were used. This reduction in non-revenue paying weight of a freight train of average length will, it is pointed out, result in an appreciable saving in operating expenses. The plates specified will be of Toncan iron made by the Central Alloy Steel Corporation, Massillon, Ohio.

Pacific Coast

United States Steel Products Co. Receives Order for 21,840 Tons for Southern Pacific Railroad Bridge

SAN FRANCISCO, March 2 (*By Air Mail*).—The Southern Pacific Co. has awarded the steel contract for the Carquinez Straits bridge, totaling 21,840 tons of structural shapes, to the United States Steel Products Co. The foundation work has been awarded to Siems, Helmers & Schaffner, Inc., St. Paul, Minn., and requires 1500 tons of reinforcing steel. Of the structural steel, 12,460 tons will be silicon steel, 2700 tons heat-treated eye bars, 6300 tons carbon steel. The remainder, 380 tons, will be required for machinery. Another important letting involved 9000 tons of plates and shapes for two large gas holders for the Pacific Gas & Electric Co., San Francisco.

Pig Iron.—Buying is confined to immediate needs. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	.....	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	.....	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	.....	24.00 to 25.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—Awards of reinforcing bars this week, totaling about 2000 tons, were the largest for any week of this year. The Soule Steel Co. booked 400 tons for the Sears-Roebuck Co. plant in Los Angeles, and 150 tons for a wharf in Oakland. The Truscon Steel Co. secured 274 tons for a warehouse in Oakland, and the Northwest Steel Rolling Mills booked 250 tons for an apartment in Seattle. Out-of-stock distributors in the San Francisco district report a fair tonnage of new work and are of the opinion that most of this pending business will be placed during the next week or two. On carload lots 2c. to 2.30c., base, prevails, with 2.60c. applying on less than carload lots. Movement of merchant bar material is limited to small lots, and 2.30c., c.i.f. Coast ports, is general.

Plates.—With one exception, plate business this week was limited to lots of less than 100 tons. The Pacific Gas & Electric Co. has awarded one 8,000,000 cu. ft. gas holder to be erected in Oakland to the Bartlett, Hayward Co., Baltimore, and one 10,000,000 cu. ft. holder, to be erected in San Francisco, to the Stacey Brothers Gas Construction Co., Cincinnati. The two jobs require a total of about 9000 tons of plates and shapes. Coast fabricators did not figure on this tonnage. Upland, Cal., which recently came into the market for 120 tons of 12 and 16-in. welded steel pipe, decided to purchase concrete pipe. The largest pending item calls for 1691 tons for a

siphon for the Kittitas division of the Yakima project, Ellensburg, Wash., bids on which will be opened next week. Prices are firmer, and 2.30c., c.i.f., is being quoted by most producers, following the recent Eastern advances.

Shapes.—Lettings of structural and plate fabricated material this week total about 33,000 tons, of which the Carquinez Straits bridge for the Southern Pacific Co., mentioned in the opening paragraph, takes nearly 22,000 tons. Two bridges for the highway department at Phoenix, Ariz., involving 435 tons and 179 tons, were placed with unnamed fabricators. The Pacific Coast Engineering Co. took 200 tons for an apartment in Oakland. Bids were opened this week on 1505 tons for a bridge at Seattle. Included among the larger inquiries are 3000 tons for the Ford plant at Long Beach, Cal., and 2000 tons for a smelter at Blackburn, Nev. A number of new apartment buildings in San Francisco have recently come before

fabricators for figures. Plain material is firm at 2.35c., c.i.f.

Cast Iron Pipe.—Cast iron pipe lettings include 349 tons of 12-in. Class B pipe for Glendora, Cal., booked by the American Cast Iron Pipe Co.; 145 tons of 6 and 8-in. Class B pipe for Puyallup, Wash., taken by the same company; 1086 tons of 2 to 10-in. Class 250 pipe for Lomita District No. 13, Los Angeles, placed with the Pacific States Cast Iron Pipe Co., and 440 tons of 6 to 12-in. Classes B and C pipe for the improvement of Thirty-first Avenue South, Seattle, booked by Argentieri & Colorossi. Bids were postponed until March 4 on 2173 tons of 4 to 24-in. Class B pipe for the improvement of South Fifty-sixth Street, Tacoma. San Diego opened bids this week on 215 tons of 4 and 6-in. Class C pipe for the improvement of El Prado Avenue, and on 144 tons of 4 and 6-in. Class B pipe for the improvement of Plata Avenue. Glendale, Cal., has opened bids on 753 tons of 4 to 12-in. Class B pipe. Wenatchee, Wash., will open bids on March 18 for 324 tons of 10 to 20-in. Classes B and C pipe, and Redwood City, Cal., and San Diego will open bids next week on 122 tons of 4 and 6-in. Class B and 173 tons of 4 and 6-in. Class C pipe.

Steel Pipe.—Oil country goods, especially well casing, continues in good demand in the southern part of the State.

Coke.—Several large shipments of foreign coke are scheduled to arrive on the Coast within the next 10 days. Most of this material will be applied against contracts placed some time ago.

Birmingham

Steel Specifications Increasing and Deliveries Are Extended—12,000 Tons of Tank Work Awarded

BIRMINGHAM, March 5.—A slight improvement in inquiries for second quarter iron has been the only noticeable change in the pig iron market the past week. Books have not yet been opened for the second quarter. Merchant producers are shipping practically all of their output. Prices remain at \$16.50 to \$17 for No. 2 foundry. The Alabama City furnace of the Gulf States Steel Co. was changed from basic to foundry iron on March 1. The Tennessee company is reconditioning its Bessemer furnaces Nos. 3 and 4 to be blown in this month. These furnaces have been inactive for nearly two years. Eleven furnaces are on foundry, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$16.50 to \$17.00
No. 1 fdy., 2.25 to 2.75 sil.	17.00 to 17.50
Basic	16.50

Finished Steel.—Increased specifications on contracts have pushed delivery dates further ahead than at any time in several months. Sales officials report a noticeable increase in specifications for stocks. Present

sales are largely for nearby delivery. A few orders are being taken for second quarter delivery at the new prices recently announced. It is a little early yet for active second quarter buying. February shipments were better than those of February of last year by a good margin. Orders are to be placed in the next few days for about 2500 tons of structural steel for a court house in Birmingham. Reeves Brothers have booked an order for 12,000 tons of fabricated tank plate for the Humble Pipe Line Co. of Texas. The total volume of reinforcing bar awards is fair, though individual orders are small. The Tennessee company is operating seven open-hearth at Fairfield and seven at Ensley. The Gulf States Steel Co. continues to work four at Alabama City.

Cast Iron Pipe.—The American Cast Iron Pipe Co. has booked orders for more than 2000 tons for Pacific Coast cities, including Los Angeles, Oakland and Seattle. The Union Pacific Railroad has placed an order with the United States Cast Iron Pipe & Foundry Co. for 100 tons. Small to

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, 3-in. and over	3.15c.
Small angles, under 3-in.	3.55c.
Small channels and tees, 3-in. to 2 1/2-in.	3.75c.
Spring steel, 3/4-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, 1/2-in. and larger	5.65c.
Com. wire nails, base per keg	\$3.40
Cement c't'd nails, 100 lb. keg	3.40

medium tonnages will soon be up for figures from Gadsden and Mobile, Ala., and New Orleans. Saluda, S. C., will open bids next week on 12,500 ft. of 6 to 10-in. pipe. Municipal buying was below normal during February, but improved weather conditions are expected to enhance the demand from this field. Plant operations are lighter than usual at this season. Prices remain at \$37 to \$38, with most of the current sales being made at the lower figure.

Coke.—Foundry coke is being sold for second quarter delivery, but the volume is not large. The domestic market is active. Foundry coke deliveries continue at about the capacity of district ovens. Prices remain firm at \$5 for both spot and contract.

Old Material.—Consumer demand is a little stronger, but it has not strengthened the market. Sales and shipments were below normal in February. Quotations are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$12.50
Scrap steel rails.....	\$12.00 to 12.50
Short shoveling turnings..	9.00
Cast iron borings.....	8.00
Stove plate.....	13.50
Steel axles.....	20.00
Iron axles.....	22.00
No. 1 railroad wrought.....	10.00 to 10.50
Rails for rolling.....	14.00 to 15.00
No. 1 cast.....	15.00
Tramcar wheels.....	13.00 to 14.00
Cast iron carwheels.....	13.00 to 13.50
Cast iron borings, chem..	13.50 to 14.00

Canada

Construction Volume Sets a High Record

TORONTO, ONT., March 5.—The Canadian pig iron market continues in sound position. Forward buying is again a feature, and some substantial contracts have been closed for second quarter. Inquiry indicates that a number of other melters are anxious to provide for their requirements over the next three months. Local blast furnace representatives also report a steady flow of orders for delivery to the end of March. Prices are unchanged in the Toronto and Montreal markets. Second quarter contracts are being accepted at prevailing prices.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$23.60
No. 2 fdy., sil. 1.75 to 2.25.....	23.60
Malleable.....	23.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$25.00 to 25.50
No. 2 fdy., sil. 1.75 to 2.25.....	25.00 to 25.50
Malleable.....	25.00 to 25.50
Basic.....	24.00 to 24.50

Imported Iron, Montreal Warehouse	
Summerlee.....	\$33.50
Carron.....	33.00

Structural Steel.—January and February set new construction records for those months. The estimated dollar volume of contracts awarded in February was \$28,425,800, which exceeded the total for any previous February on record. This takes in all known construction work throughout Canada. For the two months the increase over that of the corresponding two months of 1928 was 51.8 per cent.

A number of large office buildings, hotels, apartment houses and industrial plants were included in the list. The demand for structural steel and reinforcing bars has shown general improvement. Awards in the past week or two are estimated at 25,000 tons for Toronto and Montreal districts. Other large tonnages are in prospect, including 6000 tons for new exchange building at Toronto for the Bell Telephone Co.; 7000 tons for an office building in Toronto for the Canada Life Assurance Co., and a number of others ranging from 100 to 1000 tons for buildings in cities in Ontario.

Old Material.—Local dealers report a strong call for machinery cast, while stove plate and malleable scrap also are moving freely. Sales of heavy melting steel and turnings have im-

proved, with the demand chiefly from Hamilton, Ont., consumers. In the Montreal district practically all lines of scrap are active. Prices are firm, but unchanged.

Dealers' buying prices:

Per Gross Ton		
	Toronto	Montreal
Heavy melting steel.....	\$9.50	\$8.00
Rails, scrap.....	10.00	9.00
No. 1 wrought.....	9.00	\$11.00 to 11.50
Machine shop turnings.....	7.00	5.00
Boiler plate.....	7.00	6.00
Heavy axle turnings.....	7.50	7.50
Cast borings.....	7.50	5.00
Steel turnings.....	7.00	6.50
Wrought pipe.....	5.00	6.00
Steel axles.....	14.00	20.00
Axles, wrought iron.....	16.00	22.00
No. 1 machinery cast.....	16.00 to 17.00	17.00
Stove plate.....	13.00	13.00
Standard carwheels.....	16.00	16.00
Malleable.....	13.00	13.00
Per Net Ton		
No. 1 machinery cast.....	15.00	....
Stove plate.....	9.00	....
Standard carwheels.....	13.00	....
Malleable scrap.....	13.00	....

St. Louis

Pig Iron Melters Pressing For Shipments But Are Slow in Buying for Second Quarter

ST. LOUIS, March 5.—The sale of 5000 tons of basic iron to an East Side melter by the St. Louis Gas & Coke Corporation for March shipment was the principal transaction in an otherwise quiet week. Other sales by that maker totaled about 2800 tons, including 300 tons of malleable to an Illinois melter for prompt shipment, 500 tons of malleable to an Indiana consumer for second quarter, 700 tons of foundry to an Illinois implement manufacturer, and 300 tons of foundry to a Missouri stove plant, the two latter for second quarter. A leading Chicago interest sold 500 tons to a carwheel foundry. Shipments of the Granite City maker for February totaled 32,000 tons, which was 4000 tons in excess of production, and March shipments so far continue on the same basis. Melters are still pressing for shipments against contracts, but are delaying placing their orders for second quarter requirements as long as possible. Prices are firm and unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.....	\$20.00
Malleable, f.o.b. Granite City.....	20.50
N'th'n No. 2 fdy., deliv'd St. Louis..	22.16
Southern No. 2 fdy., deliv'd.....	20.92
Northern malleable, deliv'd.....	22.16
Northern basic, deliv'd.....	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—Domestic grades of coke are still in good demand, although buying from Detroit and other centers in the North has shown some letup. The demand for furnace coke from the smelters in this district continues heavy. Foundry coke is in good demand.

Finished Iron and Steel.—Bookings of the Granite City Steel Co. for February were slightly under January's, but compared favorably with those of February in 1927 and 1928. There

has been a noticeable improvement in incoming tonnage in most of the commodities the company manufactures. Orders for tank plates and tin mill black have been very satisfactory. Blue annealed continues active, and the company is well fortified with unfilled orders. Within the last few days there has been a revival of interest in galvanized sheets. Better business is expected with milder weather. With the coldest February in 15 years, building operations have been light.

Old Material.—The market for old material is a bit easier, melting and shoveling steel grades being 25c. a ton lower. The movement of scrap has been freer as the result of open weather. Buying by consumers has been light. Chicago mills are said to be looking to St. Louis for some materials. Railroad lists include: Union Pacific, 2000 tons; Katy, 650 tons; Ann Arbor, 300 to 400 tons; Missouri Pacific, 137 carloads; Nickel Plate, 22 carloads miscellaneous and 7 carloads

Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.10c.
Galv. sheets (No. 24).....	4.95c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.15c.
Galv. corrug. sheets.....	5.00c.
Structural rivets.....	3.75c.
Boiler rivets.....	3.75c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-press. nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

rails; Chicago, Milwaukee, St. Paul & Pacific, 48 carloads, and Mobile & Ohio, 22 carloads.

Dealers' buying prices, per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	\$13.75 to \$14.25
No. 2 heavy melting or shoveling steel	13.00 to 13.50
No. 1 locomotive tires	15.00 to 15.50
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart	15.50 to 16.00
Railroad springs	17.25 to 17.75
Bundled sheets	10.00 to 10.50
No. 2 railroad wrought	13.75 to 14.25
No. 1 bushing	10.25 to 10.75
Cast iron borings and shoveling turnings	9.75 to 10.25
Iron rails	15.00 to 15.50
Rails for rolling	16.50 to 17.00
Machine shop turnings	10.00 to 10.50
Heavy turnings	10.00 to 10.50
Steel car axles	20.50 to 21.00
Iron car axles	28.00 to 28.50
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	15.00 to 15.50
Steel rails, less than 3 ft.	16.50 to 17.00
Steel angle bars	15.00 to 15.50
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast	16.00 to 16.50
Railroad malleable	17.00 to 17.50
No. 1 railroad cast	15.00 to 15.50
Stove plate	13.75 to 14.25
Agricult. malleable	14.00 to 14.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

The Ohio code covering the specific requirements of foundries and core rooms and regulating the employment of women in core rooms is undergoing a substantial revision by a committee appointed by the Industrial Commission of Ohio. This committee represents both employers and employees. Five members of the Ohio Foundries Association are acting on this committee. W. W. Sherman, Electric Auto Lite Co., Fostoria, is acting as chairman in the absence of Ralph West, West Steel Casting Co., Cleveland, who is ill.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	.50 and 5
Carriage bolts	.50 and 5
Lag screws	.50 and 5
Hot-pressed nuts	.50 and 5
Cold-punched nuts	.50 and 5
Stove bolts	.70 and 10

*Including quantity differentials.

Boston

Foundry Iron Sold at Less Than \$21, Delivered, but Tendency Is Now Higher

BOSTON, March 5.—The H. B. Smith Co., Westfield, Mass., heater manufacturer, last week bought several thousand tons of No. 2 plain iron at a delivered price reported to be less than \$21 a ton, delivered. Otherwise, comparatively little iron was sold during the week, and except for a 2000-ton inquiry for the New England plants of the General Electric Co., there is no prospective business of importance in the market. In view of the weakness of prices, a majority of New England foundries have been delaying purchases for second quarter. A Buffalo furnace has advanced its price from \$17.50 to \$18.50 a ton, base furnace, and it is reported other stacks in that district heretofore shading \$18 are firm at that price pending an advance of 50c. a ton to be announced within the next few days. Since the Westfield, Mass., sale, New York State iron prices have been firmer.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil.	1.75 to 2.25	\$21.91 to \$22.91
*Buffalo, sil.	2.25 to 2.75	22.41 to 23.41
East. Penn., sil.	1.75 to 2.25	24.15 to 24.65
East. Penn., sil.	2.25 to 2.75	24.65 to 25.15
Va., sil.	1.75 to 2.25	25.21
Va., sil.	2.25 to 2.75	25.71
Ala., sil.	1.75 to 2.25	23.41 to 25.77
Ala., sil.	2.25 to 2.75	23.91 to 26.27

Freight rates: \$4.91 all rail from Buffalo; \$3.65 from eastern Pennsylvania; \$5.21 all rail from Virginia; \$6.91 to \$8.77 from Alabama.

*All rail rate.

Finished Material.—The Transit Department of Boston will close bids March 11 on 1050 tons of steel rails. New England railroads have recently bought an aggregate of 20,000 tons and street railroads 3000 tons additional. One railroad has still to cover on several thousand tons. Consumption of steel mill products in New England is running 20 to 30 per cent ahead of that of a year ago, and is heavier than at any time since the war. Sizable tonnages for steel bars, second quarter delivery, have been closed during the past week or 10 days and the market today is firm at 1.95c. per lb., base Pittsburgh, for round tonnages.

Imports.—February imports of pig iron totaled 1648 tons, consisting of 1548 tons of Indian and 100 tons of Scandinavian, whereas in January imports totaled 1525 tons, and in February, last year, 1215 tons. The Mystic Iron Works received no foreign ores in February, though in January it received 14,900 tons, and in February, last year, 4625 tons.

Fabricated Steel.—A change for the better in the fabricated steel market is noted. Several 200 to 300-ton jobs have developed, and it is expected that 2000 tons for a local project will be placed within a week. Two or three other jobs as large or larger may

come out for figuring before the end of March. Competition among fabricators continues keen, and low prices are sometimes quoted even on small jobs.

Coke.—For the twelfth consecutive month, New England by-product foundry coke makers have made a price of \$11 a ton, delivered within a \$3.10 freight rate zone. February specifications against contracts were heavier than in January, and March starts heavier than February. For the first time in many months ovens are not soliciting specifications.

Old Material.—During the past week the movement of old material out of New England increased, and a slightly firmer market has resulted. Shipments are being made on both new and old contracts. No. 1 heavy melting steel prices are \$12 to \$12.50 a ton, on cars shipping point, whereas a week ago sales were reported at less than \$12 up to \$12.25. Dealers are filling old forge scrap orders usually at \$9 to \$9.50. Steel turnings are coming out a little more freely, and prices are a shade easier. For mixed borings and turnings, \$6 to \$6.25 is the general range of prices paid by brokers. Machinery and textile cast are in better demand. A slightly increased business in railroad malleable has raised the price 50c. a ton. A steamer has practically completed loading several thousand tons of scrap for Danzig. Another steamer, as soon as obtainable, will load 3000 to 5000 tons. Exporters say they can sell an unlimited amount of scrap for Danzig delivery, provided vessel space can be obtained.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$12.00 to \$12.50
Scrap T rails	11.50 to 12.00
Scrap girder rails	11.00 to 11.50
No. 1 railroad wrought	11.00 to 11.25
No. 1 yard wrought	9.00 to 9.25
Machine shop turnings	6.25 to 6.50
Cast iron borings (steel works and rolling mill)	6.50 to 7.00
Bundled skeleton, long	9.00 to 10.00
Forge flashings	10.00 to 10.25
Blast furnace borings and turnings	6.00 to 6.50
Forge scrap	9.00 to 9.50
Shafting	14.50 to 15.00
Steel car axles	17.50 to 18.00
Wrought pipe 1 in. in diameter (over 2 ft. long)	10.75 to 11.25
Rails for rolling	12.25 to 12.50
Cast iron borings, chemical	10.00 to 10.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$14.50 to \$15.00
No. 1 machinery cast	16.00 to 16.50
No. 2 machinery cast	14.00 to 14.50
Stove plate	11.00 to 11.50
Railroad malleable	17.50 to 18.00

Production of bituminous coal in the week ended Feb. 23 is reported by the United States Bureau of Mines at 11,762,000 net tons, a small reduction from the totals of the two preceding weeks. This brings the aggregate for the fuel year since Aug. 1 to 453,971,000 tons, compared with 425,647,000 tons in the preceding year.

Buffalo

Pig Iron Sales Are Heavy and Prices Are Stiffening—Steel Mills Maintain High Operation

BUFFALO, March 5.—Buffalo furnaces have continued to book heavily for prompt and second quarter shipment. Estimates of the amount sold during February are upward of 75,000 tons. Active inquiry totals fully 15,000 tons. Talk of higher prices is general, and the market is reported to have firmed up for outside shipment to the extent of making the minimum quotation \$17.50 instead of \$17. The district price is firm at \$18.50 for No. 2 plain, 1.75 to 2.25 per cent silicon. The Worthington Pump & Machinery Corporation is understood to have placed about 1700 tons of foundry iron and a small lot of malleable. The amount of the Massey-Harris Harvester Co. business placed for its Canadian plant is said to have been 5000 tons. Among pending inquiries is one for 3000 tons of malleable and another for 2600 tons. The General Electric Co. seeks 3000 to 4000 tons of foundry and malleable. Another blast furnace will blow in before next week.

Prices per gross ton, f.o.b. furnace:
No. 2 fdy., sil. 1.75 to 2.25.....\$18.50
No. 2X fdy., sil. 2.25 to 2.75..... 19.00
No. 1 fdy., sil. 2.75 to 3.25..... 20.00
Malleable, sil. up to 2.25..... 19.00
Basic..... 17.50
Lake Superior charcoal..... 27.28

Finished Iron and Steel.—High production is being maintained, and business is excellent in practically every line. A new apartment house will require 200 tons of reinforcing bars and steel joists. Operations are running 90 to 95 per cent.

Old Material.—The district's largest consumer of steel scrap on Monday placed orders for a large tonnage of Nos. 1 and 2 heavy melting steel at \$16.50 for the former grade and at \$15 for the latter. These prices duplicate those paid by the same buyer on tonnages bought about two weeks ago. The scrap this company has recently ordered will, it is said, satisfy its requirements for two or three months. A sizable purchase of No. 1 steel is reported to have been made by another steel company in the past week

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.75c.
Cold-fin. flats, sq. and hex.....	4.45c.
Rounds.....	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.60
Black wire, base per 100 lb.....	3.75

at \$17.25, delivered. Notwithstanding these purchases, dealers are offering \$17.50 to fill old orders taken at \$18. An active market exists in No. 1 machinery cast scrap, a number of small sales having been made at \$16.50 to \$17. Malleable scrap is active, and cast iron borings and short mixed turnings are firmer on revival of interest by blast furnaces.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$16.50 to \$17.50
No. 2 heavy melting steel.....	15.00
Scrap rails.....	17.00 to 18.00
Hydraul. comp. sheets.....	15.00
Hand bundled sheets.....	12.00 to 12.50
Drop forge flashings.....	14.00 to 14.50
No. 1 busheling.....	16.25 to 16.50
Hvy. steel axle turnings.....	14.00 to 14.50
Machine shop turnings.....	8.00 to 8.50
No. 1 railroad wrought.....	13.50 to 14.00

Acid Open-Hearth	
Knuckles and couplers.....	19.00 to 19.50
Coil and leaf springs.....	19.00 to 19.50
Rolled steel wheels.....	19.00 to 19.50
Low phos. billet and bloom ends.....	20.00 to 20.50

Electric Furnace Grades	
Short shov. steel turnings.....	13.50 to 14.00

Blast Furnace Grades	
Short mixed borings and turnings.....	11.50 to 12.50
Cast iron borings.....	11.50 to 12.50
No. 2 busheling.....	10.00 to 10.50

Rolling Mill Grades	
Steel car axles.....	18.75 to 19.25
Iron axles.....	21.00 to 22.00

Cupola Grades	
No. 1 machinery cast.....	16.00 to 17.00
Stove plate.....	14.50 to 15.00
Locomotive grate bars.....	13.50 to 14.00
Steel rails, 3 ft. and under.....	19.50 to 20.00
Cast iron carwheels.....	14.00 to 14.50

Malleable Grades	
Industrial.....	18.50 to 19.00
Railroad.....	18.50 to 19.00
Agricultural.....	18.50 to 19.00

Co. has little iron left in its yards. Orders for Southern iron for delivery to points on or north of the Ohio River have been light, and the schedule is unchanged at from \$16.50 to \$17, Birmingham.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25.....	\$20.39 to \$20.89
Ala. fdy., sil. 1.75 to 2.25.....	20.19 to 20.69
Ala. fdy., sil. 2.25 to 2.75.....	20.69 to 21.19
Tenn. fdy., sil. 1.75 to 2.25.....	20.19
S'th'n Ohio silvery, 8 per cent.....	27.39 to 28.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—The leading sheet steel producer reports that bookings in the past week were in excess of output, which is being maintained at 100 per cent of capacity. Backlogs are large enough to assure continuation of the present rate of operations through the remainder of the first quarter. While a substantial share of the tonnage is coming from the automobile industry, demand from all consuming lines is excellent. Prices of all varieties of sheets are holding at the current schedule. The Newport Rolling Mill Co. has followed the lead of other sheet manufacturers by announcing second quarter prices of 2.20c., base Pittsburgh, on blue annealed, 3.7c. on galvanized and 2.95c. on black.

Coke.—With moderation of the weather has come a lessened demand for by-product domestic coke. Specifications and orders for by-product foundry coke have been so heavy, however, that ovens have not yet caught up on deliveries. There has been a readjustment of by-product foundry coke prices in southern Ohio, which establishes \$6.50, Connellsville, as the ruling quotation. This is equivalent to \$7.90, Ashland, or \$10.05, delivered Cincinnati, an advance of 90c. a ton. In Indiana there has been no change. A leading Wise County beehive coke maker has announced a reduction of 25c. a ton on both foundry and furnace grades, the new schedule calling for from \$4.75 to \$5 on foundry and from \$4.50 to \$4.75 on furnace.

Old Material.—The market is fairly steady, although blast furnace grades are weak. Steel plants are

Cincinnati

Pig Iron Sales Total 15,000 Tons or More—Substantial Inquiries for Second Quarter Pending

CINCINNATI March 5.—Pig iron sales in the past week totaled more than 15,000 tons and inquiries for second quarter are in substantial volume. Bookings included 5000 tons of foundry iron for an Ohio melter, 3000 tons for another consumer and 500 tons of malleable for an Indiana company. A Hamilton, Ohio, user is expected to buy from 2000 to 3000 tons of Northern foundry, and a Kokomo, Ind., melter is

asking for 1000 tons. At Anderson, Ind., a consumer is inquiring for from 500 to 1000 tons of Northern foundry, while a West Virginia company is in the market for 500 tons. As a result of the increased demand, prices have firmed up. Northern Ohio furnaces are quoting a minimum of \$18.50, base furnace, and Valley producers are holding to \$17.50, furnace. Southern Ohio iron is priced at \$18.50, Ironton, although the Marting Iron & Steel

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops.....	4.05c.
Bands.....	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares.....	4.35c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.75c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	3.85c.
Small rivets.....	.65 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.95
Cement c'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap-weld. steel boiler tubes, 2-in.....	\$16.00
4-in.....	33.00
Seamless steel boiler tubes, 2-in.....	17.00
4-in.....	34.00

well supplied with material for the next 30 to 60 days and it is doubtful whether any sizable purchases of scrap will be made until early in the second quarter. Meanwhile, dealers are trading conservatively, waiting to see what turn the market will take. The Baltimore & Ohio has a list totaling 10,300 tons closing this week; 3000 tons of steel rails is included.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$13.75 to \$14.25
Scrap rails for melting.....	13.75 to 14.25
Loose sheet clippings.....	10.00 to 10.50
Bundled sheets.....	11.00 to 11.50
Cast iron borings.....	10.00 to 10.50
Machine shop turnings.....	9.50 to 10.00
No. 1 busheling.....	11.00 to 11.50
No. 2 busheling.....	7.00 to 7.50
Rails for rolling.....	14.50 to 15.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	13.75 to 14.25
Short rails.....	18.50 to 19.00
Cast iron carwheels.....	12.75 to 13.25
No. 1 machinery cast.....	19.25 to 19.75
No. 1 railroad cast.....	15.25 to 15.75
Burnt cast.....	10.50 to 11.00
Stove plate.....	10.50 to 11.00
Brake shoes.....	10.50 to 11.00
Railroad malleable.....	15.25 to 15.75
Agricultural malleable.....	14.25 to 14.75

Reinforcing Steel

Cleveland Terminals and San Francisco Bridge Take
1500 Tons Each

AWARDS of 9700 tons reported during the week included 1500 tons each for Cleveland Union Terminals work and for a bridge at San Francisco. New projects, requiring 3200 tons, included no jobs of outstanding size. Awards follow:

NEW YORK, 350 tons, building for Interboro News Co.; from Turner Construction Co., general contractor, to Jones & Laughlin Steel Corporation.

BROOKLYN, 100 tons, tunnel for Bush Terminal Co., to Concrete Steel Co.

ALBANY, N. Y., 400 tons, foundations for telephone building, to Jones & Laughlin Steel Corporation.

VINCENNES, IND., 200 tons, elevator for Iglehart Milling Co., to Laclede Steel Co.

INDIANAPOLIS, 350 tons, building for Sears, Roebuck & Co., to Laclede Steel Co.

CLEVELAND, 1500 tons, for Cleveland Union Terminals Co., to Jones & Laughlin Steel Corporation.

SPRINGFIELD, ILL., 500 tons, Illinois State roadwork, to Clinton Bridge Co., Clinton, Iowa.

EVANSTON, ILL., 500 tons, apartment building on Hinman Avenue, to Concrete Steel Co.

MEMPHIS, TENN., 400 tons, building for Sears, Roebuck & Co., to Laclede Steel Co.

CHICAGO, 550 tons, Naragansett apartment building, to Calumet Steel Co.

CHICAGO, 700 tons, public school building, awarded by Mychuta Brothers, general contractors, to Barton Spiderweb System.

AURORA, ILL., 200 tons, building for Pneumatic Tool Co., to American System of Reinforcing.

LOUISVILLE, KY., 300 tons, building for Sears, Roebuck & Co., to Laclede Steel Co.

HOUSTON, TEX., 300 tons, building for Sears, Roebuck & Co., to Laclede Steel Co.

SAN FRANCISCO, 1500 tons, foundations for Carquinez Straits bridge for Southern Pacific Co., to Helmers & Schaffner, Inc., St. Paul.

OAKLAND, 274 tons, warehouse for Port Commission, to Truscon Steel Co.

OAKLAND, 150 tons, wharf, Glascock and Derby Streets, to Soule Steel Co.

LOS ANGELES, 400 tons, addition to Sears, Roebuck & Co. plant, Ninth and Boyle Streets, to Soule Steel Co.

LOS ANGELES, 225 tons, apartment building on Pellisier Square, to unnamed bidder.

LOS ANGELES, 200 tons, apartment building, 634 Gramercy Place, to Blue Diamond Co.

LOS ANGELES, 131 tons, hotel at 1043 North Alvarado Street, to unnamed bidder.

LOS ANGELES, 192 tons, apartment building, 6208 Franklin Avenue, to unnamed interest.

SEATTLE, 250 tons, apartment building, Spring and Summit Streets, to Northwest Steel Rolling Mills.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

CAMBRIDGE, MASS., 190 tons, hotel.

BROOKLYN, 600 tons, sections 1 and 2, route 100, of municipal subway system; Carleton Construction Co., low bidder.

OSSINING, N. Y., 120 tons, high school; Louis Kell, general contractor.

PHILADELPHIA, 500 tons, Washington Lane and Foulkrod public schools; bids opened March 5.

BUFFALO, 200 tons, apartment house.

INDIANAPOLIS, 375 tons, building for Sears, Roebuck & Co.

OAK PARK, ILL., 100 tons, building for Marshall Field & Co.

WICHITA, KAN., 800 tons, elevator for Pillsbury Milling Co.

DALLAS, TEX., 350 tons, building for Sears, Roebuck & Co.

Railroad Equipment

Orders for 7700 Freight Cars Include 4150 for the St. Paul—
New York Central to Buy 4300 and Erie 2500 Cars

FREIGHT car buying during the last week was the heaviest since the beginning of the present purchasing movement, with orders totaling 7700. Outstanding orders included 4150 for the Chicago, Milwaukee, St. Paul & Pacific, 1500 for the Texas & Pacific, 1000 for the Maine Central and 1000 for the Missouri Pacific. Freight car inquiries also bulked very large, amounting to 6950. Of these the New York Central will buy 4300 and the Erie 2500. Locomotive orders totaled 57, including 25 for the Union Pacific. The Erie is inquiring for 35 locomotives. Details of the week's business follow:

New York Central is inquiring for 4300 freight cars of the following types: 1000 70-ton high-side gondola, 1000 50-ton steel box, 1000 55-ton steel automobile, 500 70-ton low-side gondola, 500 70-ton hopper and 300 50-ton flat.

Erie Railroad is inquiring for 2500 freight cars of the following types: 1000 70-ton hopper, 500 70-ton gondola, 500 40-ton automobile and 500 40-ton box. This road is also inquiring for 20 2-8-4 type and 15 eight-wheel switching locomotives and is soon expected to enter market for 30 all-steel suburban coaches, 10 express cars and five gas-electric cars.

Texas & Pacific has ordered 700 automobile cars from Pressed Steel Car Co., 300 automobile cars from American Car & Foundry Co. and 500 stock cars and 50 caboose car underframes from Pullman Car & Mfg. Corporation.

Maine Central has ordered 1000 box cars from Standard Steel Car Co.

Missouri Pacific has ordered 500 box cars from Mount Vernon Car Mfg. Co. and 500 from American Car & Foundry Co.

Universal Refrigerator Transit Co. has ordered 50 refrigerator cars from American Car & Foundry Co.

Baltimore & Ohio is inquiring for 100 express refrigerator cars and seven parlor-cafe coaches.

Republic Iron & Steel Co. is inquiring for 73 steel gondola car bodies.

Union Pacific has ordered 25 4-12-2 type locomotives and 20 extra tenders from American Locomotive Co.

Western Pacific has ordered five Mikado type locomotives from American Locomotive Co.

Central of New Jersey is inquiring for five eight-wheel switching locomotives.

South African Railways have ordered eight Pacific type and four Mountain type locomotives from Baldwin Locomotive Works. This company is also inquiring for 300 20-ft. cattle wagons.

Union of Socialistic Soviet Republics

has ordered two 20-ton double compartment scale cars, self-propelled and electric motor-driven and one 50-ton combination ore car of self-heating type from Atlas Car & Mfg. Co.

Anzan Steel Works, South Manchuria, China, has purchased two blast furnace scale charging cars through Perin & Marshall, New York, from Atlas Car & Mfg. Co.

South Manchurian Railway Co. has ordered four 75-ton center bottom discharge gate pier cars from Atlas Car & Mfg. Co.

Chicago, Milwaukee, St. Paul & Pacific has ordered 1000 automobile cars from Bettendorf Co., 500 automobile cars from Pullman Car & Mfg. Corporation, 200 automobile cars from Pacific Car & Foundry Co., 650 stock cars from Standard Steel Car Co., 350 flat cars from Ryan Car Co., 150 flat and 300 ore cars from Pressed Steel Car Co., 1000 ballast cars from General American Car Co. and 15 locomotives from Baldwin Locomotive Works.

Chicago Surface Lines have ordered 33 car bodies and 100 car truck sets from J. G. Brill Co., 33 car bodies from Cummings Car & Coach Co. and will build 34 car bodies in its own shops.

Southern Pacific is in market for 50 caboose cars.

Cotton Belt may soon enter market for 1500 cars.

Chesapeake & Ohio has ordered 12 express cars from Pullman Car & Mfg. Corporation.

The trend of retail sales, according to *Automotive Industries*, is leading automobile manufacturers to foresee a market for new vehicles during the spring and early summer months that will more than tax production of the factories. In consequence, factories have entered March on increased schedules.

Non-Ferrous Metal Markets

Copper Quieter But Strong, Tin Sales Light at Steady Prices, Lead Active and Higher, Zinc Normal and Firm

NEW YORK, March 5.

Copper.—After another week of successive advances in prices, even more rapid than in the previous week, conditions are decidedly quieter. Evidently producers have impressed consumers with the fact that continued attempts to buy copper far into the future will result in higher and higher prices. Domestic buyers in the last few days have shown less interest, and the market again presents what seems to approach a more stabilized atmosphere. Foreign consumers are

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY						
	March 5	March 4	March 2	March 1	Feb. 28	Feb. 27
Lake copper, New York.....	19.62½	19.62½	19.62½	19.62½	19.62½	19.12½
Electrolytic copper, N. Y.*.....	19.25	19.25	19.25	19.25	19.25	19.25
Straits tin, spot, N. Y.....	48.75	48.87½	...	48.75	48.75	48.87½
Lead, New York.....	7.10	7.10	7.10	7.10	7.10	7.10
Lead, St. Louis.....	7.05	7.00	7.00	7.00	7.00	7.00
Zinc, New York.....	6.70	6.70	6.70	6.70	6.70	6.70
Zinc, St. Louis.....	6.35	6.35	6.35	6.35	6.35	6.35

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.
†Nominal.

much more active than the domestic, and purchases thus far in March for export have totaled about 12,000 tons. It is estimated that they still have about 55,000 tons to buy for March, April and May delivery. Prices of electrolytic copper, as the result of the active buying during the last week, now stand at 19.50c., delivered in the Connecticut Valley, which is the highest price since November, 1919. At the same time Copper Exporters, Inc., increased its quotation to 19.75c., c.i.f. usual European ports. These levels were reached on Saturday, March 2. Unless heavy demand again develops, the present levels are expected to hold for some time. Sales in February were very large at about 65,000 gross tons for foreign shipment, and approximately 90,000 tons

for domestic delivery, but they were not as large as in September and December, last year. Lake copper is quiet but exceedingly firm at 19.50c. to 19.62½c., delivered.

Copper Averages.—The average price of Lake copper for February, based on daily quotations in THE IRON AGE, was 18.10c. delivered in the East. The average price of electrolytic copper was 17.74c., refinery, or 17.99c., delivered in the Connecticut valley.

Tin.—Sales of Straits tin for the week ended Saturday, March 2, totaled 800 to 900 tons. There was only one active day, Tuesday, Feb. 26, when 400 tons changed hands. On other days about 100 tons changed hands on each day. All the business was done by consumers. February statistics

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	50.75c. to 51.75c.
Tin, bar.....	52.75c. to 53.75c.
Copper, Lake.....	20.50c.
Copper, electrolytic.....	20.25c.
Copper, casting.....	20.00c.
Zinc, slab.....	7.50c. to 8.00c.
Lead, American pig.....	7.87½c. to 8.37½c.
Lead, bar.....	9.87½c. to 10.87½c.
Antimony, Asiatic.....	11.50c. to 12.50c.
Aluminum No. 1 ingots for remelting (guar'nt'd over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commerc'l grade.....	30.00c. to 40.00c.
Solder, ½ and ½.....	31.75c. to 32.75c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	54.00c.
Tin, bar.....	56.00c.
Copper, Lake.....	20.63c.
Copper, electrolytic.....	20.63c.
Copper, casting.....	18.13c.
Zinc, slab.....	8.00c.
Lead, American pig.....	7.90c. to 8.00c.
Lead, bar.....	10.00c.
Antimony, Asiatic.....	16.00c.
Babbitt metal, medium grade.....	19.50c.
Babbitt metal, high grade.....	58.00c.
Solder, ½ and ½.....	34.00c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass.....	23.37½c. to 24.37½c.
Copper, hot rolled, base sizes.....	28.12½c. to 29.12½c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.37½c. to 31.37½c.
Seamless Tubes—	
Brass.....	28.25c. to 29.25c.
Copper.....	29.37½c. to 30.37½c.
Brass Tubes.....	31.37½c. to 32.37½c.
Brass Rods.....	21.12½c. to 22.12½c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks.....	10.00c. to 10.50c.
Zinc sheets, open.....	11.00c. to 11.50c.

Non-Ferrous Rolled Products

Mill prices on all brass products have been advanced 1c. per lb. in the last week, the most recent change having been effective March 4. Copper sheets and copper in rolls are quoted 1½c. higher, copper seamless tubes 1¼c. higher and copper wire 1½c. above last week's levels. Zinc sheets and lead full sheets are unchanged.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass.....	23.75c.
Copper, hot rolled.....	29.12½c.
Zinc.....	9.75c.
Lead (full sheets).....	10.75c. to 11.00c.
Seamless Tubes—	
High brass.....	28.62½c.
Copper.....	30.12½c.
Rods—	
High brass.....	21.50c.
Naval brass.....	23.50c.
Wire—	
Copper.....	21.37½c.
High brass.....	24.25c.
Copper in Rolls.....	
Brass.....	28.12½c.
Brass Tubes.....	31.75c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	33.00c.
Tubes, base.....	42.00c.
Machine rods.....	54.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	16.00c.	18.00c.
Copper, hvy. and wire.....	15.50c.	17.50c.
Copper, light and bottoms.....	13.50c.	14.75c.
Brass, heavy.....	9.00c.	10.50c.
Brass, light.....	7.75c.	9.00c.
Hvy. machine composition.....	13.00c.	14.50c.
No. 1 yel. brass turnings.....	10.00c.	11.00c.
No. 1 red brass or compos. turnings.....	11.50c.	12.50c.
Lead, heavy.....	5.50c.	6.00c.
Lead, tea.....	4.25c.	4.75c.
Zinc.....	3.25c.	3.75c.
Sheet aluminum.....	13.50c.	15.50c.
Cast aluminum.....	12.00c.	14.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—		Base per Lb.
High brass.....	23.75c.	
Copper, hot rolled.....	29.12½c.	
Copper, cold rolled, 14 oz. and heavier.....	31.37½c.	
Zinc.....	10.00c.	
Lead, wide.....	10.55c.	
Seamless Tubes—		
Brass.....	28.62½c.	
Copper.....	30.12½c.	
Brass Rods.....	21.50c.	
Brass Tubes.....	21.75c.	

were decidedly unfavorable. Some of the chief features were as follows: The world's visible supply increased about 2165 tons, bringing the total to 26,402 tons on March 1; American deliveries into consumption were 6750 tons, which is lower than the early estimates, but about equal to the later one; American stocks on March 1 were 3307 tons, of which 2537 tons was landing and 770 tons in store; there was 8920 tons afloat to the United States on March 1, making the American visible supply 12,227 tons, which is large; further shipments from England this month amount to over 850 tons, including those reported today, indicating the approach of an over-supply; Straits shipments in February were 7788 tons and Banca shipments were 1741 tons, which are large. The market yesterday and today in New York was quiet with spot Straits tin quoted at 48.75c., New York. London prices today were very close to those of a week ago, with spot standard quoted at £220, future standard at £222 10s., and spot Straits at £223 5s. The Singapore price today was £225 5s.

Lead.—Buying has been quite active, particularly in the last few days, and prices are decidedly stronger. On Wednesday, Feb. 27, the leading interest advanced its price from 6.95c. to 7.10c., New York, as its contract quotation. In the West this advance and the heavy demand from consumers have stiffened prices so that sales at St. Louis have been made at 7c. by at least one producer, and as high as 7.20c. has been done. The quotation at St. Louis today was 7.05c. as

the minimum and sales have involved March principally, with some April mand closed.

Zinc.—A fairly good business in prime Western zinc is reported as having been done each day at unchanged quotations which are 6.35c., East St. Louis, or 6.70c., New York. The market is regarded as stabilized and in a quite satisfactory condition. Stocks of all grades of zinc were about 40,000 tons on March 1. The price of ore at Joplin was again \$41 a ton, Saturday, March 2, and stocks in that district were again reduced by excess shipments (14,151 tons) over output (12,000 tons). Stocks are now about 16,470 tons, or not much more than a week's requirement.

Antimony.—Chinese metal is a little easier at 9.12½c., New York, duty paid, for all positions. More interest is being shown by consumers.

Non-Ferrous Metals at Chicago

CHICAGO, March 5.—Sales are active and prices for copper and lead are particularly strong.

Prices per lb., in carload lots:
Lake copper, 19.62½c.; tin, 49.62½c.; lead, 7.20c.; zinc, 6.45c.; in less-than-carload lots: antimony, 10.12½c. On old metals we quote copper wire, crucible shapes and copper clips, 14.62½c.; copper bottoms, 13.12½c.; red brass, 12.87½c.; yellow brass, 9.62½c.; lead pipe, 5.62½c.; zinc, 3.62½c.; pewter, No. 1, 27.62½c.; tin foil, 27.62½c.; block tin, 40.12½c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Fabricated Structural Steel

Awards of 74,240 Tons Include 21,840 Tons for Railroad Bridge—20,500 Tons in Tanks

STRUCTURAL steel awards at 74,240 tons were the largest for any week this year. They included the Carquinez Straits bridge at San Francisco for the Southern Pacific, 21,840 tons, 12,000 tons for tanks in Texas, 8500 tons for tanks on the Pacific Coast, 10,000 for a railroad office building in Philadelphia and 8000 tons for Chesapeake & Ohio Railroad shops. Awards follow:

QUINCY, MASS., 270 tons, grocery store, to Palmer Steel Co.
NEW YORK, 800 tons, loft building at 329 West Thirty-ninth Street, to Lehigh Structural Steel Co.
NEW YORK, 500 tons, apartment building at 4 Sutton Place, to Easton Structural Steel Co.
UTICA, N. Y., 250 tons, armory, to unnamed local fabricator.
WESTWOOD, N. J., 140 tons, bank building, to Hudson Structural Steel Co.
BATWAY, N. J., 425 tons, plant for National Electric Products Co., to Jones & Laughlin Steel Corporation.
PHILADELPHIA, 1850 tons, boiler house for Pennsylvania Railroad, to Shoemaker Bridge Co.
PHILADELPHIA, 10,000 tons, Pennsylvania Railroad Building, to Bethlehem Steel Co.
PHILADELPHIA, 135 tons, double-track bridge at Girard Point for Pennsyl-

vania Railroad, to Bethlehem Steel Co.
PHILADELPHIA, 560 tons, Bank of Philadelphia & Trust Co. building, to American Fabricated Steel Co.
TRENTON, N. J., 160 tons, bridge for New Jersey State Highway Commission, to Rust Engineering Co., New York.
STATE OF MARYLAND, 150 tons, highway bridge, to Dietrich Brothers.
HUNTINGTON, W. VA., 8000 tons, shops at Huntington and Russell, Ky., for Chesapeake & Ohio Railway Co., to McClintic-Marshall Co.
SAN ANTONIO, TEX., 1300 tons, Alamo National Bank building, to Alamo Structural Steel Co., local.
BEAVER FALLS, PA., 150 tons, garage, to Guilbert Steel Co.
PITTSBURGH, 450 tons, bridges for Chartiers Southern Railway, to American Bridge Co.
DETROIT, 1300 tons, building for Produce Terminal Co., to Whitehead & Kales Co.
TOLEDO, OHIO, tonnage not stated, bridge for Toledo Terminal Railroad, to American Bridge Co.
CLEVELAND, 200 tons, transformer stations for Cleveland Union Terminals Co., to City Iron Works.
CINCINNATI, 600 tons, building for Cambridge Tile Co., to Dayton Structural Steel Co.
CINCINNATI, 100 tons, building for Carthage Mills, to McClintic-Marshall Co.
CHICAGO, 700 tons, public school at

Damon and Foster Avenues, to Gage Structural Steel Co.
LAKE FOREST, ILL., 250 tons, building for Ferry Hall, to Gage Structural Steel Co.
OAK PARK, ILL., 750 tons, building for Marshall Field & Co., to Midland Structural Steel Co.
GRANITE CITY, ILL., 450 tons, addition to finishing plant for Commonwealth Steel Co., to Stupp Brothers Bridge & Iron Co.
IOWA CITY, 1600 tons, stadium for State University of Iowa, to unnamed fabricator.
PHOENIX, ARIZ., 435 tons, bridge over Agua Fria River; general contract to F. E. Stearman Construction Co., Phoenix; steel to unnamed fabricator.
PHOENIX, 179 tons, bridge on Nevada-Utah highway; general contract to James J. Burke Co., Salt Lake City; steel to unnamed interest.
OAKLAND, 200 tons, apartment building, Lake and Madison Streets, to Pacific Coast Engineering Co.
OAKLAND, 4000 tons plates and shapes, gas holder for Pacific Gas & Electric Co., to Bartlett Hayward Co.
SAN FRANCISCO, 4500 tons plates and shapes, gas holder for Pacific Gas & Electric Co., to Stacey Brothers Gas Construction Co.
SAN FRANCISCO, 21,840 tons, Carquinez Straits bridge for Southern Pacific Co., to United States Steel Products Co.

Structural Projects Pending

BOSTON, 350 tons, Beacon Street apartment building.
BOSTON, 200 tons, Nurses Home.
BOSTON, 150 tons, Washington Street building.
LYNN, MASS., 225 tons, building for Lynn Gas & Electric Co.
NEW YORK, 8000 tons, subway section 7, route 109; bids March 17.
NEW YORK, 500 tons, apartment building in East Fifty-fourth Street.
LONG ISLAND RAILROAD, 150 tons, bridge.
OCEAN TOWNSHIP, Monmouth County, N. J., 216 tons, bridge; bids opened March 6.
READING, PA., 100 tons, Abraham Lincoln Hotel.
BIRMINGHAM, 2300 tons, Jefferson County Court House; general contract to Southern Ferro Construction Co., Atlanta.
NEW ORLEANS, 1000 tons, County Court House.
COATESVILLE, PA., 1400 tons, plant for International Coal Carbonization Co., affiliated with International Combustion Engineering Co.
TONAWANDA, N. Y., 500 tons, highway bridge.
DUNDAS, ONT., 150 tons, high school.
SAULT STE. MARIE, ONT., 125 tons, addition to Plummer Memorial Hospital.
WINDSOR, ONT., 300 tons, school.
LONDON, ONT., 1000 tons for Hotel London.
TORONTO, ONT., 125 tons, factory addition for Prest-O-Lite Storage Battery Co.
MONTREAL, 700 tons, addition to plant of Northern Electric Co.
MONROE, MICH., 3000 tons, mill building for Newton Steel Co.
EVANSTON, ILL., 750 tons, building for Marshall Field & Co.
STATE OF MINNESOTA, 1200 tons, highway bridge.
MILWAUKEE, 12,000 tons, Court House; McClintic-Marshall Co., low bidder for fabrication, assembling and delivery.
MILWAUKEE, 500 tons, addition to an office building.
SEATTLE, 1505 tons, bridge across West waterway; bids opened.
SAN FRANCISCO, 130 tons, apartment building, Gough and Austin Streets; bids opened.

PERSONAL

ROBERT PATTERSON LAMONT, president American Steel Foundries, Chicago, who has been appointed Secretary of Commerce in President Hoover's cabinet, has spent the greater part of his business life in the railroad equipment manufacturing field. He was born at Detroit in 1867 and attended the University of Michigan, where he was graduated in 1891 with the civil engineering degree. After a brief period as an engineer with the Chicago Exposition in 1891



R. P. LAMONT
Secretary of Commerce

and 1892, he became associated with the Chicago contracting firm of Shailer & Schinglan, where he remained for five years. He then became vice-president of the Simplex Railway Appliance Co. and in 1905 became first vice-president of the American Steel Foundries. He has been president of this company since 1912 and is also chairman of the Griffin Wheel Co., Chicago, and was recently named president of the newly organized General Steel Castings Corporation, Philadelphia, which has been formed by the Steel Foundries company, the American Locomotive Co. and the Baldwin Locomotive Works. Mr. Lamont has also been active in national business life, particularly in the affairs of the Chamber of Commerce of the United States. He is at present serving as a vice-president of that organization, representing the North Central district, and is chairman of the program committee for the annual meeting to be held April 29 to May 3. During the war he served as chief of the procurement division, Ordnance Department, United States Army, in which he holds the rank of colonel. He also served as a member of the flood control committee of the Chamber of Commerce and was a member of that organization's special committee

which presented its taxation program to the House Committee on Ways and Means in 1927. He is a member of the general executive committee of the Railway Business Association and is a member of numerous other associations and clubs. Mr. Lamont is at present a director of the First National Bank of Chicago, the Morris Plan Bank of Chicago, Montgomery Ward & Co., Armour & Co., the Globe Steel Tubes Co., the Wahl Co., Dodge Brothers, Inc., the International Harvester Co., the American Radiator Co., the Benedict Stone Co. and the Baldwin Locomotive Works.

FRED D. BAKER, recently with Strong, Carlisle & Hammond Co., Cleveland, has become associated as a sales engineer with Charles H. Besly & Co., Chicago, and will represent the company at Cleveland, Buffalo and Erie, Pa., in the sale of grinders and abrasive disks.

GEORGE E. HOWARD, for 22 years vice-president and sales manager of the Commonwealth Steel Co., Granite City, Ill., has relinquished the duties of sales manager, but will continue his active association with the company as vice-president and a director. HARRISON HOBLITZELLE, who has been vice-president in charge of purchases, has been placed in charge of the sales department, with the title of vice-president and manager of sales, and STANLEY G. WIGHT has been appointed manager of purchases. Mr. Wight has been with the company for several years, having served successively in the engineering, the plant and the foreign departments. In his new capacity he will work under the general supervision of Mr. Hoblitzelle. CLARENCE H. HOWARD, JR., manager of the foreign department, has also been elected secretary of the company, succeeding OLIVER T. LEDFORD, who has resigned from active service. Mr. Howard, Jr., will be assisted by E. HOWARD HOOPER, assistant to the president, who has been named assistant secretary.

FRANK C. FARRELL, who retired some time ago as manager of the Youngstown district of the Youngstown Sheet & Tube Co., will soon become associated with the Steel & Tubes division, Republic Iron & Steel Co., Youngstown.

T. W. ROBINSON, vice-president Illinois Steel Co., Chicago, has been named as a member of the commission, headed by former Vice-President Charles G. Dawes, which has been formed to reorganize the finances of the Dominican Republic.

EDWARD E. DOUGLAS has been appointed sales manager for the Eastern division of the Irving-Pitt Mfg. Co., Kansas City, Mo., and will have

headquarters at 321 Broadway, New York.

GEORGE B. HOGABOOM, chemist for the Hanson-Van Winkle-Munning Co., Matawan, N. J., will give an illustrated talk on the "Crystal Growth of Metals," at a meeting of the Worcester, Mass., chapter of the American Society for Steel Treating, to be held at Rebboli's Restaurant, 10 Barton Place, on Thursday evening, March 7.

LAMAR S. PEREGOY, vice-president and secretary of the Sivyver Steel Casting Co., Milwaukee, was made general manager of the company at a recent meeting of the directors. He has been identified with the Sivyver



L. S. PEREGOY

organization since its inception. He is also vice-president of the Interstate Drop Forge Co. and a director of the Federal Malleable Co., both of Milwaukee, and affiliated with the Sivyver company. MARTIN A. FLADOES, sales manager of the Sivyver company, has been made a director. He has been associated with the company for eight years.

JAMES M. MORTON, some years ago foundry superintendent for A. G. Spaulding & Co. at Springfield, Mass., and later in the foundry business for paper and mill machinery at Saratoga Springs, N. Y., is treasurer of the C. & M. Metal Products Corporation, manufacturer of pressed metal work, Springfield, Mass.

C. J. FREUND, who is associated with the Falk Corporation, Milwaukee, and is chairman of the apprentice training committee of the American Foundrymen's Association, will address the Chicago Foundrymen's Club, Thursday evening, March 7, on "Apprentice Training in the Foundry."

EVERETT L. KEIG has been appointed representative in the northern Illinois and southern Wisconsin territory of the Chicago Steel Service Co., 3912 South Ashland Avenue, Chicago.

JESSEL S. WHYTE, vice-president and secretary MacWhyte Co., Kenosha, Wis., manufacturer of wire rope, cable, etc., has been appointed general manager, and HERBERT E. SAWYER, vice-president and treasurer, has been promoted to general sales manager of that company.

COL. BENJAMIN F. CASTLE, former chief of the Control Board of the Army Air Service in Washington, and later engaged in banking and investment business in New York, has been elected president of the Great Lakes Aircraft Corporation, Cleveland.

ROBERT S. ALTER, vice-president American Tool Works Co., Cincinnati, has returned from an eight months' business trip in European countries.

E. E. SPRINGER, formerly sales manager at Birmingham for Reeves Brothers, steel plate fabricators, has been appointed manager of Eastern sales for that company and will be in charge of an office to be opened in New York. R. R. ORWIG, vice-president, has succeeded Mr. Springer at Birmingham.

JOHN HOWE HALL, metallurgist Taylor-Wharton Iron & Steel Co., High Bridge, N. J., will speak on manganese alloy steels at a meeting of the Indianapolis chapter of the American Society for Steel Treating, to be held at the Indianapolis Chamber of Commerce on Monday evening, March 11.

ULICK R. EVANS, lecturer in Cambridge University, Cambridge, England, who delivered the recent Institute of Metals Lecture, will speak on "The Corrosion of Metal and Its Industrial Significance," at Columbia University (Physics Laboratories), March 18, at 8 p. m.

LE ROY RICHARDS, formerly sales representative in the Philadelphia district for the Alan Wood Iron & Steel Co., is now associated with the Columbia Steel & Shafting Co., Pittsburgh, and will have headquarters at Cedar and Westmoreland Streets, Philadelphia.

E. J. BLAIR, formerly superintendent of the Lincoln Radiator Corporation, Utica, N. Y., will hold a similar position with the Utica Radiator Corporation, Utica, which has taken over the former Lincoln plant.

GEORGE A. WHALON, who for several years has been a manufacturers' agent for machine tools, small tools and machine shop equipment in Japan, has returned to the United States and will become identified with the sales of machinery in the Detroit territory for the National Acme Co., Cleveland.

DR. ZAY JEFFRIES, research director Aluminum Co. of America, Cleveland, and president American Society for Steel Treating has been appointed Henry M. Howe Memorial

lecturer for the annual meeting of the American Institute of Mining and Metallurgical Engineers in February, 1930, in New York.

CHARLES A. ANDERSON, JR., has been elected president of the Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, and A. V. WADSWORTH, until recently manager Wescott Valve Co., East St. Louis, Ill., has been elected vice-president and general manager. Mr. Anderson has been identified with the company for 21 years, for five years in the shop and as purchasing agent, and the remainder of the time in sales capacities. He



C. A. ANDERSON, JR.



A. V. WADSWORTH

was in charge of the company's New York office for about a year prior to the opening of an office in Philadelphia in 1914, of which he had charge until 1922, when he was transferred to Pittsburgh and made assistant general manager of sales. Since Jan. 1, 1923, he has been vice-president in charge of sales. Mr. Wadsworth received his mechanical training with the National Transit Co., Oil City, Pa., with which he was associated for about 16 years. He later became factory manager and assistant sales manager of the Buckeye Traction Ditcher Co., Findlay, Ohio. During the war he was connected with the United States Ordnance Department, Cleveland Division, in an

engineering advisory capacity in connection with the production of caterpillar traction machinery. Following the war he became general manager of the Pomeroy Machinery Co., Pomeroy, Ohio, plant of which was absorbed by the Parkersburg Rig & Reel Co., Parkersburg, W. Va. When Henry Wescott, head of the Wescott Valve Co., died, Mr. Wadsworth took charge of that company as secretary-treasurer and manager. This plant was moved from Seneca Falls, N. Y., to East St. Louis.

WILLIAM W. BROWN, for 12 years Atlanta, Ga., district sales manager for the Youngstown Sheet & Tube Co., has been transferred to Pittsburgh as district manager of sales, succeeding ARTHUR PURNELL, who recently was appointed Chicago district manager of sales. Mr. Brown has been with the Youngstown company for 20 years and was in the general offices at Youngstown before becoming Atlanta district sales manager. WALTON W. FORD, who has served under Mr. Brown as manager of the New Orleans branch office, has been named Atlanta district sales manager. He represented the Steel & Tube Co. of America in the Southeastern territory prior to its acquisition by the Youngstown Sheet & Tube Co.

HARRISON SOUDER, formerly general superintendent Cornwall Ore Bank Co. and general manager of the Cornwall division, Bethlehem Mines Corporation, Cornwall Borough, Pa., has opened an office as consulting engineer at 40 Wall Street, New York.

TOM STEWART, general superintendent of the J. I. Case Threshing Machine Co., Racine, Wis., discussed the improved foundry practice of his company at a meeting of the Wisconsin Gray Iron Foundry Group, held at the Hotel Schroeder, Milwaukee, on March 6.

WALTER C. VOSS has been appointed Detroit sales manager for the Acklin Stamping Co., Toledo, Ohio, and will maintain headquarters in the General Motors Building, Detroit. He succeeds HAROLD JAY, who has become associated with the Edward Ford Glass Co., Detroit.

FREDERICK S. BLACKALL, JR., was elected vice-president and general manager of the Taft-Peirce Mfg. Co., Woonsocket, R. I., at a recent meeting of the board. He is the son of the late Frederick S. Blackall, who, until his death in October, 1928, was vice-president and general manager of the company. The younger Mr. Blackall has been general manager of the company since his father's death.

CHARLES E. DIEBOLD, who has been tool and machine supervisor in the shock absorber division of the National Acme Co., Cleveland, has been appointed sales engineer for that company, specializing in Acme and Gridley automatics.

The Weston Fellowship in Electrochemistry

Dr. Edward Weston, electrochemist and engineer of international reputation, has established the Edward Weston Fellowship with the American Electrochemical Society. The candidate will be selected by the society and selection will be based on marked capacity in carrying out research in the science of electrochemistry or its applications. The award will be made without distinction on account of sex, citizenship, race or residence. The successful candidate may carry out his research at any university or institute approved by the society. The date of the first award (approximately \$1,000) is not definitely fixed, but will probably be in the fall of this year. Those interested should apply to the office of the American Electrochemical Society, Columbia University, New York.

Dr. Weston was born in England, May 9, 1850, and there studied medicine. He came to the United States in 1870, entering the employ of the American Nickel Plating Co. He is responsible for many improvements in the nickel-plating art. At that time



DR. EDWARD WESTON

the electroplating industry was very much hampered by the lack of low-voltage generators, and Dr. Weston set about to invent several new types of dynamo electric machines and established, in Newark in 1875, the first factory in America devoted exclusively to that class of machine. In 1881 his plant was consolidated with the United States Electric Lighting Co., of which he was electrical engineer till 1888. At that time he formed a new company, the Weston Electrical Instrument Co., Waverley Park, Newark, N. J., for the main purpose of manufacturing the Weston electrical instruments—voltmeters, ammeters, etc. He has been president of this company for a good many years. The well-known Weston cadmium cell is the fundamental volt standard throughout the world. Dr. Weston has been the recipient of many honors and awards.

OBITUARY

LANE JOHNSON, chief engineer United Engineering & Foundry Co., Pittsburgh, died at his home at Ingram, Pa., on March 2. He was 52 years old and was a graduate of the Massachusetts Institute of Technology. He had wide and varied



LANE JOHNSON

steel plant experience before he joined the United company, having served as mechanical engineer for the American Rolling Mill Co., Middletown, Ohio; chief engineer Kokomo Steel & Wire Co., Kokomo, Ind., and mechanical engineer Colorado Fuel & Iron Co., Pueblo, Colo.

CHARLES DORMAN, a director in Dorman, Long & Co., Ltd., Middlesbrough, England, died on Feb. 28, aged 54 years. He was the eldest son of Sir Arthur Dorman, chairman of the company.

SAMUEL TWEEDALL, superintendent of the Evansville Tool Works, Evansville, Ind., died suddenly at his home on Feb. 25. He was 73 years of age and had been associated with the company since 1893.

CHARLES W. BINGHAM, formerly president of the William Bingham Co., Cleveland, wholesale hardware jobber, died suddenly on March 1, aged 82 years. As president of the Bingham company he had succeeded his father, who was the founder of the company. He had retired from active business 15 years ago but retained directorships in a number of companies. He was a director of the Cleveland-Cliffs Iron Co. and the Bourne-Fuller Co. and was formerly president of the Standard Tool Co., Cleveland.

HERBERT B. VAN PELT, president Service Steel Co. and Plymouth Tube

Co., Detroit, died on Feb. 25, aged 59 years. He had gone to Detroit from Cleveland 14 years ago as sales manager of the Pittsburgh Steel Shafting Co. and in 1920 had organized the companies of which he was the head. Two sons, Donald C. and Richard S. Van Pelt, were associated with him in these companies.

JESSE J. BOWEN, district sales engineer of the Pangborn Corporation, Baltimore, died suddenly at his home in Rochester, N. Y., on Feb. 25, aged 57 years. He was the first field representative of the Pangborn Corporation, having joined it in 1906, and was well known in the foundry industry of New England, Illinois, Wisconsin, New York and Pennsylvania.

MYRON C. ATWOOD, president and general manager of the Western Wheeled Scraper Co., Aurora, Ill.



M. C. ATWOOD

died at his home in that city, Feb. 26, following a lingering illness. He was born on a farm near Aurora in 1863, and received his early business training in railroad work. In 1906 he was made assistant manager of the Western Wheeled Scraper Co., in 1910, general manager, and, in 1925, president and general manager.

EUGENE J. McVOY, president of the McVoy Sheet & Tin Plate Co., Chicago, died Feb. 25, at Cairo, Egypt, where he was spending the winter. He was born at Cleveland in 1872, but went to Chicago as a boy, where he was later associated with his father, the late John McVoy, in the organization of John McVoy & Co., tin plate manufacturers, later reorganized as the McVoy Sheet & Tin Plate Co.

British and Continental Prices Strong

Deliveries Delayed by Severe Weather—Export Trade Improves—
Welsh Mills May Establish Tin Plate Production Quotas

(By Cable)

LONDON, ENGLAND, March 4.

THE coal situation is improving further, with collieries reopening and the South Wales Relief Committee arranging to supply boots and clothes to men willing to resume work. Output has been affected by the influenza epidemic.

Ore and coke prices have advanced and pig iron is firm with a steadily broadening domestic and export demand. Furnaces are reluctant sellers and price advances on Cleveland iron are expected. Hematite iron makers are well sold ahead and asking higher prices.

Finished steel demand is affected by the severe weather. Shipyards have been asking for delays in deliveries, but the situation is likely to improve as the weather is milder. The steel market is strong with makers of most specifications well booked with orders.

Welsh tin plate makers have proposed a substitute for the present restriction of output. The proposal involves the determination monthly of a quota based on prospective demand and previous months' production and deliveries. Each mill will be allotted a monthly percentage, based on its output during 12 months ended November, 1928. The maximum allocation for the first month would be one-twelfth the output of all mills for 12 months ended November, 1928.

The minimum price of tin plate continues at 18s. (\$4.36) per base box,

f.o.b. works port. The market is quiet with business in small lots only, but makers are expecting an increase in demand now that the minimum price is unchanged.

Galvanized sheets are quiet. Japan is inquiring for light-gage black sheets, but is unwilling to pay sellers' prices.

The Clyde shipbuilding output in February was 14 vessels of 34,500 tons. The Canadian Pacific Railway has placed two vessels with the Fairfield Shipbuilding & Engineering Co., Glasgow, and the Nederland Steamship Co., two motor-vessels with the Caledon Shipbuilding & Engineering Co., Dundee. Jonas & Colver, Ltd.,

Sheffield, has reorganized under the name of Jonas & Colver, Novo, Ltd. The company formerly operated also as the Novo Steel Works.

Continental competition has relaxed because of the high prices asked and the delay in deliveries, which are further delayed by navigation difficulties and congestion of Belgian railroads. Some small sales of Continental semi-finished material are made to consumers here when domestic material is unobtainable.

The Saar output in January was 169,000 tons of pig iron and 183,000 tons of raw steel. Luxemburg output in January was 242,000 tons of pig iron and 225,000 tons of raw steel.

French Steel Mills Are Well Engaged Prices Firm with Prospect of Further Advances—Furnaces Seek to Increase Pig Iron Exports

PARIS, FRANCE, Feb. 11.—The French foreign trade balance shows a debit in 1928 of 2,100,000,000 fr., compared with a credit balance in 1927 of 1,175,000,000 fr. This is the result of an increase in imports of raw materials and a slight decrease in exports of manufactured products. Prices have recently shown a decided upward trend and, with the new act governing house rents effective, a possible increase in wheat duties in compliance with demands by French farmers and new legislation on so-

cial insurance, a further rise is expected.

Export demand for pig iron is active, and on some grades there is a shortage of supplies available for foreign consumers. Prices are consequently firm, with the quotation on phosphoric foundry iron at £3 7s. 6d. to £3 8s. (\$16.37 to \$16.49) per ton, f.o.b. Antwerp. Furnaces are making efforts to sell in Central European markets, especially in Austria. One large producer, the Pont-a-Mousson works, is offering 2.50 to 3 per cent

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works with American equivalent figured at \$4.85 per £ as follows:

Durham coke, del'd....	£0 18½s. to £0 19s.	\$4.48 to \$4.60
Bilbao Rubio ore.....	1 2½ to 1 3	5.45 to 6.18
Cleveland No. 1 foundry	3 9½	16.85
Cleveland No. 3 foundry	3 7	16.25
Cleveland No. 4 foundry	3 6	16.00
Cleveland No. 4 forge..	3 5½	15.88
Cleveland basic (nom.)	3 5	15.76
East Coast mixed.....	3 13	17.70
East Coast hematite....	3 13½	17.82
Rails, 60 lb. and up....	7 15 to 8 5	37.59 to 40.01
Billets	6 5 to 7 0	30.31 to 33.95
Ferromanganese	13 15	66.69
Ferromanganese (export)	13 10 to 14 0	65.47 to 67.90
Sheet and tin plate bars,		
Welsh	5 2½	25.82
Tin plate, base box....	0 18 to 0 18½	4.37 to 4.43
Black sheets, Japanese		
specifications	13 7½	64.87
Ship plates	7 12½ to 8 2½	1.66 to 1.76
Boiler plates.....	9 0 to 10 10	1.95 to 2.27
Tees	8 2½ to 8 12½	1.76 to 1.86
Channels	7 7½ to 7 17½	1.60 to 1.71
Beams	7 2½ to 7 12½	1.55 to 1.65
Round bars, ¾ to 3 in.	7 15 to 8 5	1.67 to 1.78
Steel hoops	9 0 to 10 0	1.95 to 2.16
Black sheets, 24 gage..	10 0	2.16
Galv. sheets, 24 gage..	13 10 to 13 12½	2.92 to 2.95
Cold rolled steel strip,		
20 gage (nom.).....	12 0	2.64

*Ex-ship. Tees, nominal.
(a) Nominal.

Continental Prices All F.O.B. Channel Ports

(Per Metric Ton)			
Foundry pig iron (a):			
Belgium	£3 6s. to £3 10s.	\$16.00 to \$16.97	
France	3 6 to 3 10	16.00 to 16.97	
Luxemburg	3 6 to 3 10	16.00 to 16.97	
Basic pig iron (a):			
Belgium	3 6	16.00	
France	3 6	16.00	
Luxemburg	3 6	16.00	
Coke	0 18	4.37	
Billets:			
Belgium	5 4	25.22	
France	5 4	25.22	
Merchant bars:			
Belgium	6 3	1.34	C. per Lb.
France	6 3	1.34	
Luxemburg	6 3	1.34	
Joists (beams):			
Belgium	5 3	1.13	
France	5 3	1.13	
Luxemburg	5 3	1.13	
Angles:			
Belgium	6 0 to 6 2	1.31 to 1.32	
¾-in. plate:			
Belgium (a).....	6 11	1.43	
Germany (a)	6 11	1.43	
¾-in. ship plate:			
Belgium	6 5½	1.37	
Luxemburg	6 5½	1.37	
Sheets, heavy:			
Belgium	6 1	1.31	
Germany	6 1	1.31	

silicon foundry iron at £3 6s. (\$16) per ton, delivered Wintersdorf on the frontier.

In Luxemburg, the Acieries Reunies de Burbach-Eich-Dudelange has blown in a furnace at Dudelange, producing 450 tons a day. When reconstruction of this plant is completed it will comprise three blast furnaces with a total output of 1350 tons a day, compared with a previous output of 900 tons from six furnaces. The Société des Hauts Fourneaux des Acieries de Differdange has begun reconstruction work at its Rumelange plant, which has been inactive since the Armistice.

Semi-finished material is firm both for export and for domestic sale. Finished material is active and mills are so well booked in many cases that they have adopted an independent attitude, selecting the orders and sizes they prefer and refusing orders not considered satisfactory. The larger mills show a continued inclination to accept only the normal specifications in shapes, leaving special sizes to the smaller producers.

Export business in sheets is almost entirely in the light gages, for which British competition is keen. In heavy-gage sheets and plates, demand is rather small, from both foreign and domestic consumers.

Recently domestic producers of pig iron have been seeking to acquire control of consuming plants, to obtain permanent outlets for at least part of their production. The Hauts Fourneaux de Saulnes, controlled by Jean Raty & Co., has become interested in the Etablissements Piat of Paris and in the Fonderies Chappee of Le Mans, and recently acquired an interest in the Etablissements Nanquette.

Germans Expect End of Steel Cartel

(By Radio)

BERLIN, GERMANY, March 4.

THE director general of the Vereinigte Stahlwerke A. G., Düsseldorf (United Steel Works), declares that Germany must be prepared for termination of the International Steel Cartel.

Belgian reports indicate renewed improvement in the export market. German export prices on structural shapes, bars and sheets are slightly weaker, but the export market on pig iron, semi-finished material, bands and wire rods continues firm.

All syndicate domestic prices are unchanged for March. The home market on semi-finished material, wire rods and wire is satisfactory, but for structural shapes, bands, sheets and rails is less favorable. The heaviest current demand is for semi-finished steel, on which mills are booked with orders for about seven weeks ahead.

The National Association of Waste Material Dealers, Inc., Times Building, New York, will hold its annual meeting March 19 and 20 at the Congress Hotel, Chicago.

German Domestic Trade in Small Volume Unemployment Increasing and Export Trade Only Fair— Wages Higher and Strikes Threaten

BERLIN, GERMANY, Feb. 14.—There is a continued decline in domestic business and the total of unemployed, 2,170,000, is considerably larger than a year ago. Discounting seasonal unemployment in some industries, the total has increased by about 220,000. Domestic demand for heavy iron and steel is smaller, but the decline in 1928 as compared with 1927 was less than was at first estimated. The Pig Iron Syndicate reports domestic consumption of iron in 1928 at 9,858,140 metric tons, compared with 10,090,115 tons in 1927.

While satisfactory export orders are being booked, reports from Brussels, usually indicative of Continental conditions, point to a slight weakness in steel prices. However, Belgian pig iron prices have not decreased and the market for semi-finished material is well maintained as a result of small stocks and continued heavy demand. British competition for light-gage sheet business is a considerable factor in the sheet market.

The German Pig Iron Syndicate is selling iron for March delivery at unchanged prices. The European Band Syndicate has advanced the base price on bands for export by 2s. 6d. (60c.) per ton. Steel producers in the Rhineland and Westphalia report a decline in demand for semi-finished material, but most mills have a good backlog of orders. The steel bar market is quiet, and structural steel buying is light because of the severe winter weather. The sheet market is rather depressed and prices on the thin gages, not controlled by a syndicate, have declined. The domestic tube market is quiet and prices lack firmness, but export quotations are being well maintained.

Krupp to Build Tube Mill

A modern tube mill is to be constructed by the Friedrich Krupp A. G., near the new Borbeck-Essen blast furnaces. It was announced at a recent meeting of the company that production of semi-finished products exceeded the requirements of the Krupp finishing mills and that a new manufacturing outlet was needed. The Mannesmann Tube Co., which formerly bought a heavy tonnage of semi-finished material from the Krupp works, is increasing its own production of semi-finished steel and, with the formation of the Vereinigte Stahlwerke A. G., the Krupp works lost two other large consumers of semi-finished, the Phoenix A. G. and Friedrich Thyssen & Co. The decision of the Friedrich Krupp A. G. to produce tubes has caused some apprehension among other German tube mills. Production of tubes has been increasing considerably, having totaled about 830,000 tons in 1928, compared with 790,000 tons in 1927 and only 640,000 tons in 1913. The German Tube Syndicate reports that only about 40 per

cent of the capacity of all works is being used at present. The Krupp works, however, expects a considerable increase in demand in view of present plans for long-distance delivery of gas and water.

The new Borbeck plant of Friedrich Krupp A. G., not yet completed, will consist of two blast furnaces of 700 tons a day capacity, one furnace going into blast in March and the other about May. Despite the present business depression other steel producers are planning expansion. The Vereinigte Stahlwerke A. G. at Düsseldorf reports that it has expended about 250,000,000 m. on technical improvements since 1926 and is considering construction of new plants.

Wages Still Advancing

The labor situation has not improved much, with wages still increasing and new strikes threatening. In January, the average weekly wage of skilled workers in the steel industry was about \$11.70 a week and unskilled labor was receiving \$9.02 a week. The labor unions persist in their claim that the iron and steel industry made enormous profits in 1927 and 1928 that have not been disclosed, and the German Metal Workers' Union is demanding that the steel industry shall be State organized like the coal mining industry, with a council equally representing employees and employers. This council, with final authority vested in the Ministry of Industry, would have powers affecting the manufacture of pig iron and raw steel, ferromanganese, semi-finished steel, rolled products and railroad materials, ore mining and the purchase and sale of scrap. The Socialist Minister of Labor is said to favor this plan, but the Minister of Industry and other conservative members of the cabinet oppose it.

Activity in engineering plants declined slightly in January, but business in machine tools and paper-making machinery was good. Activity in agricultural machinery was limited to exports, and there has been no improvement in sales of textile machines. The Linke-Hofmann-Busch A. G. has been awarded orders for sleeping cars by the Chilean State Railroads.

Imports of Motor Cars Increasing

Exports of automobiles in 1928 totaled 4578 cars, compared with 2688 in 1927. Imports aggregated 17,819 cars, compared with 11,383 in 1927. The share of the United States in imports increased from about 48 per cent of the total cars received from abroad in 1927 to about 70 per cent in 1928. Imports of automobiles included 12,393 from the United States in 1928 compared with 5400 in 1927, 2111 from Italy in 1928 compared with 2493 in 1927, and 1716 from Austria

in 1928 compared with 1454 in 1927.

During 1928, 38,000 cars were assembled in Germany from imported parts, compared with 22,000 assembled in 1927. The total imports for 1928 of complete automobiles or cars assembled in Germany was 55,000, compared with 34,000 in 1927. The total estimated German demand for 1928 was 160,000 cars. Progressive reduction of the duty on foreign cars prescribed in the tariff of 1925 does not appear to have been so successful as predicted. It was believed that German production costs would decline sufficiently so the minimum duty of 75 m. per double-centner, effective in July, 1928, would be ample. German exports of motor cars were checked in 1928 by the renewal and, in some cases, increases of foreign import duties.

German Munitions Works Making Ferrozirconium

HAMBURG, GERMANY, Feb. 16.—Certain German and Austrian steel works, which produced shells of zirconium steel during the war and have been closed since the Armistice, have resumed operation and are making ferrozirconium analyzing 65 per cent Zr, 26 per cent Fe, 7.7 per cent Al and 0.12 per cent Ti. Sizable quantities are being sold to the electrical industry and to machinery builders. The ferrozirconium made by these plants during the war was of a different analysis, which has not been made public.

Iron Ore Deposits of South Germany to Be Worked

HAMBURG, GERMANY, Feb. 16.—The Schwabische Hüttenwerke G.m.b.H. has been established at Gutmandingen in South Germany on the site of the large iron ore deposits in the Jura. While the deposits estimated at more than 100,000,000 metric tons are lean, with only 30 to 32 per cent iron content, the new plant expects to be able to produce profitably with the cheap hydroelectric power available.

German Alloy Sold Commercially

Scleron, an Aluminum Alloy with High Tensile Strength, Offered in Castings, Forgings and Rolled Products

HAMBURG, GERMANY, Feb. 16.—"Scleron," an aluminum alloy recently developed by the Hedderheimer Kupferwerk bei Frankfurt-am-Main, is now being produced on a commercial basis and being offered in increasing quantities. The Hedderheimer works, the only maker at present, is offering it in bars, shapes, castings, sheets and tubes for motors, and in forgings. Advantages claimed for it include great resistance to wear, relative cheapness, high tensile strength and resistance to corrosion and oxidation. It is said to be superior to other aluminum alloys because it can be worked into a much wider variety of forms.

Scleron is described by the maker as an aluminum alloy with an analysis of 12 per cent Zn, 3 per cent Cu, 0.6 per cent Mn, 0.5 per cent Si, 0.4 per cent Fe, and 0.1 per cent Li. When hot, the alloy can be welded, pressed, forged and heat treated. It is produced in two qualities; soft and hard. The soft material brought to the usual temperature, can be pressed, drawn

and bent. Hard Scleron can also be bent and straightened with a large bending radius.

The soft material is heat treated at 290 deg. C. with tolerance of 10 deg., the time of treatment usually being about 1 hr., after which it is cooled in any convenient way. The hard Scleron is heat treated at 470 to 480 deg. C. for about 3 hr., after which it is quenched quickly. The physical properties of Scleron are:

	Soft	Hard
Specific gravity	2.9	....
Coefficient of expansion	0.000026	....
Brinell hardness	70	120
Elastic limit*	....	25,500 to 28,500
		lb. per sq. in.
Yield point	....	43,000
		lb. per sq. in.
Ultimate strength	43,000	70,000
		lb. per sq. in.
Elongation	15 to 20	10 to 15 per cent
Modulus of elasticity	10,400,000	....
Electrical conductivity	0.167×10 ⁸ mho per cu. cm.	....

*Load inducing a permanent set of 0.001 per cent.

22 Miles of Wire Rope Used to Brace Airship Hull

The American Cable Co., 215 North Michigan Avenue, Chicago, supplies the information that 22 miles of wire rope is used to brace the hull of the new British dirigible R-100, which will fly to the United States probably in April. The R-100 is larger than the Graf Zeppelin, the German ship which flew to the United States last fall. Although the Graf Zeppelin was 776 ft. long and the R-100 is only 709 ft. long, the gas capacity of the British ship is 5,000,000 cu. ft., against the Graf's 3,750,000 cu. ft. The large increase in gas capacity comes through a difference in diameter, the Graf's

diameter being 100 ft., while that of the R-100 is 133 ft.

The R-100 can carry 100 passengers with a crew of 40 and yet have space for 10 tons of freight or mail. Within its hull are dining rooms, lounges, smoking rooms, cabins and a promenade deck which rival in spaciousness and appointments those on the great ocean liners. The R-100 is powered by six Rolls-Royce Condor 700 hp. motors and has a cruising radius of 4000 to 5000 miles and a speed of 80 miles per hr.

The wire rope and processed fittings on the R-100 were furnished by Brunton's of Scotland, the licensee of the American Cable Co. More than 9000 "Tru-Loc" fittings are used.

Iron and Steel and Other Manufactures

Census Figures* for 1927 (with 1925 comparisons in Italics)

	Establishments	Wage Earners	In Millions of Dollars			
			Wages	Products	Value Added by Manufacture	Average Wage
Iron and Steel and Their Products.....	6,346	835,091	1,264.4	6,199.3	2,658.6	\$1,514
	6,068	851,270	1,284.3	6,461.7	2,727.3	1,509
Non-Ferrous Metals and Products.....	6,658	270,665	380.4	2,668.7	888.3	1,406
	6,924	275,292	380.8	2,833.8	887.0	1,383
Machinery	12,038	886,344	1,287.8	5,367.0	3,304.3	1,453
	11,807	858,843	1,225.4	5,020.3	3,034.9	1,427
Transportation Equipment, land, water and air..	2,537	494,905	803.3	4,702.4	1,794.4	1,623
	2,778	559,578	908.4	5,451.8	2,062.6	1,624
Railroad Repair Shops.....	2,309	428,291	648.9	1,289.7	744.2	1,515
	2,363	457,766	668.2	1,332.7	769.0	1,460
Metal-Working (the Five Above).....	29,888	2,915,296	4,384.8	20,227.0	9,389.9	1,504
	29,940	3,002,739	4,467.2	21,100.2	9,480.9	1,488
All Industries.....	191,863	8,351,257	10,848.8	62,713.9	27,585.8	1,299
	187,224	8,381,511	10,727.3	62,668.3	26,771.4	1,280

*From the Census of Manufactures, made by the Department of Commerce.

Second Best Exports in Eight Years

January Total of 274,296 Tons Showed Heavy Gain
in Rolled and Finished Items—Imports
Slightly Less Than December

WASHINGTON, March 2.—Exports of iron and steel products from the United States in January totaled 274,296 gross tons, and were the largest for any month since August, 1928, with an outgoing movement of 287,297 tons. The August shipments were the largest since February, 1921, when the total was 393,328 tons. Compared with exports in December, aggregating 221,810 tons, those for January represented an increase of 23.6 per cent; and a gain of 33.3 per cent over the 205,680 tons of January, 1928.

Imports in January totaled 54,793 tons, a slight decrease, 406 tons, from the 55,199 tons imported in December. There was a drop of 4077 tons from the imports of 58,870 tons in January of last year.

Exports in January, with a daily average of 8848 tons, showed gains in all the most important lines, except plates, when compared with those for December. Scrap exports increased to 50,753 tons from 36,308 tons; steel bar shipments rose to 22,406 tons from

14,937 tons; tin plate to 26,387 tons from 17,027 tons; steel rails to 17,883 tons from 12,114 tons; casing and oil line pipe to 16,330 tons from 7871 tons; and black and galvanized pipe to 10,344 tons.

Beginning with January, the Iron

and Steel Division, Department of Commerce, has supplemented the table on exports. Former listings have been broken down into more detail, so that certain items heretofore grouped with others have been set forth separately. The result is that skelp, casing and oil line pipe, black and galvanized pipe and malleable iron screwed pipe fittings are now so shown.

Of the scrap exports in January, 15,376 tons went to Japan, 12,472 tons to Italy, 10,029 tons to Poland, 8939 tons to Canada and 2732 tons to Germany. Japan was the largest foreign buyer in January of American tin plate, taking 6202 tons; while 3831 tons went to Canada, 3393 tons to Argentina, 3139 tons to China, 995 tons to Chile and 964 tons to British India. Canada took 10,806 tons of steel bars, while 4279 tons went to Japan, 2441 tons to the United Kingdom and 723 tons to Cuba.

Chile was the largest export market for steel rails, taking 2373 tons; Japan

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS (In Gross Tons)

	January, 1929	December, 1928
Austria	57	14
Belgium	9,339	12,505
Czechoslovakia	645	166
France	5,793	4,788
Germany	5,178	11,324
Italy	153	112
Netherlands	3,311	2,648
Norway	2,293	114
Sweden	2,292	3,001
Switzerland	1	36
United Kingdom	7,471	5,182
Europe	36,533	59,890
Canada	10,911	9,944
Honduras .....	...	2
Mexico	33	37
British India	7,315	5,324
British Malaya .....	...	1
China	1	...
Japan .....	...	1
Total	54,793	55,199

Exports of Iron and Steel from the United States (In Gross Tons)

	January, 1929	December, 1928	January, 1928
Pig iron	3,769	8,414	4,403
Ferromanganese	168	582	1
Scrap	50,753	36,308	29,800
Pig iron, ferroalloys and scrap	54,690	45,304	34,204
Ingot, blooms, billets, sheet bar	1,901	1,626	809
Skelp, iron and steel	2,819	3,886	4,865
Wire rods	4,411	2,830	3,970
Semi-finished steel	9,131	8,342	9,644
Steel bars	22,406	14,937	8,093
Alloy steel bars	1,785	707	521
Iron bars	1,311	1,187	395
Plates, iron and steel	17,385	18,736	10,009
Sheets, galvanized	16,423	13,759	11,076
Sheets, black steel	13,465	12,759	17,552
Sheets, black iron	1,003	1,454	1,036
Hoops, bands, strip steel	6,891	5,612	3,319
Tin plate;terne plate	26,387	17,027	19,668
Structural shapes, plain material	17,259	17,086	9,812
Structural material, fabricated	10,742	9,549	6,560
Steel rails	17,883	12,114	22,714
Rail fastenings, switches, frogs, etc.	2,627	3,240	9,370
Boiler tubes	1,524	1,392	1,147
Casings and oil line pipe	16,330	7,871	9,854
Black and galvanized welded pipe	10,344	7,122	10,090
Malleable iron screwed pipe fittings	1,135	959	696
Plain wire	3,845	3,522	3,775
Barbed wire and woven wire fencing	6,529	5,371	5,314
Wire cloth and screening	152	203	185
Wire rope	620	610	485
Wire nails	1,498	1,007	1,477
Other nails and tacks	894	879	736
Horseshoes	21	48	55
Bolts, nuts, rivets and washers, except track	1,411	857	867
Rolled and finished steel	199,870	158,008	154,805
Cast iron pipe and fittings	2,257	2,813	2,864
Car wheels and axles	2,818	2,569	932
Iron castings	1,181	1,695	1,065
Steel castings	1,444	1,129	707
Forgings	1,242	786	394
Castings and forgings	8,942	8,992	5,962
All other	1,663	1,164	1,065
Total	274,296	221,810	205,680

Imports of Iron and Steel Into the United States (In Gross Tons)

	January, 1929	December, 1928	January, 1928
Pig iron	16,108	10,825	11,127
Ferromanganese*	5,502	3,277	5,184
Ferrosilicon†	446	946	405
Ferrocchrome‡	28	48	31
Scrap	7,207	6,548	4,674
Pig iron, ferroalloys and scrap	29,291	21,644	21,421
Steel ingots, blooms, billets and slabs	1,717	1,218	1,319
Wire rods	1,183	4,328	1,079
Semi-finished steel	2,900	5,546	2,398
Rails and splice bars	71	634	3,150
Structural shapes	9,470	10,100	11,080
Boiler and other plates	73	107	58
Sheets and saw plates	827	1,264	4,292
Steel bars	3,134	3,224	7,876
Bar iron	239	109	149
Hoops, bands and cotton ties	1,182	1,482	1,918
Tubular products (wrought)	2,659	4,067	2,046
Nails, tacks, staples	708	799	181
Tin plate	41	51	39
Bolts, nuts, rivets and washers	18	51	25
Round iron and steel wire	602	443	304
Barbed wire	285	831	350
Flat wire; strip steel	149	256	135
Steel telegraph and telephone wire .....	...	...	36
Wire rope and strand	133	157	94
Other wire	41	90	41
Wire cloth and screening .....	...	...	...
Rolled and finished steel	19,632	23,715	31,774
Cast iron pipe	2,760	3,866	2,778
Castings and forgings	210	428	499
Total	54,793	55,199	58,870
Manganese ore*	15,344	20,365	9,376
Iron ore	180,308	204,799	251,178
Magnesite	2,616	4,310	2,990

*Manganese content only.
†Silicon content only.
‡Chromium content only.

Destination of Iron and Steel Exports from the United States (In Gross Ton)

Countries of Destination	January, 1929	December, 1928	January, 1928	Countries of Destination	January, 1929	December, 1928	January, 1928
North and Central America and the West Indies				Netherlands	91	211	312
Canada and Newfoundland	120,136	107,369	78,442	Rumania	247	(b)	385
Cuba	90,453	87,581	61,611	Soviet Russia	70	31	1,103
Mexico	6,888	5,129	3,892	United Kingdom	5,535	4,264	4,705
Guatemala	7,930	7,265	4,874	Other Europe	14,234	8,445	1,147
Honduras	528	406	3,284	Far East	70,623	58,571	77,861
Panama	892	(a)	333	British Malaya	1,084	228	504
Salvador	2,239	1,393	448	China	8,910	4,764	14,857
British West Indies	1,689	183	217	Dutch East Indies	8,149	3,162	2,190
Other West Indies	5,256	419	541	India and Ceylon	1,286	841	1,193
Other Central America	3,600	4,008	2,619	Japan and Chosen	37,515	37,465	47,320
	661	985	623	Kwantung	568	181	1,435
South America	45,260	33,276	39,038	Philippine Islands	9,112	6,936	7,390
Argentina	12,260	6,567	10,066	Australia	1,851	4,408	2,559
Brazil	5,427	5,467	9,018	New Zealand	768	303	180
Chile	5,678	4,129	5,810	Other Asia and Far East	1,380	283	233
Colombia	3,687	4,086	4,656	Africa	1,932	1,924	1,045
Peru	3,836	2,109	1,261	British South Africa	134	1,466	841
Uruguay	1,238	424	659	Egypt	1,746	124	66
Venezuela	12,684	9,736	7,345	Mozambique	22	234	46
Other South America	450	758	223	Other Africa	30	100	92
Europe	36,345	20,670	9,294	Total	274,296	221,810	205,680
Belgium	60	767	519				
France	1,244	3,167	237				
Greece	65	15	38				
Italy	14,799	3,770	848				

(a) Included in "Other Central America."
(b) Included in "Other Europe."

ranked second, taking 1300 tons; Brazil took 1010 tons; Canada, 993 tons; and Argentina, 514 tons. Of the 17,385 tons of plates exported, Canada took 14,369 tons. Exports of wrought tubular products were widely scattered. Taking 3446 tons, the Philippine Islands was the heaviest consumer of outgoing shipments of galvanized sheets; Canada took 2587 tons. Of the 13,465 tons of black steel sheets exported, Canada took 7270 tons and Japan 2072 tons.

Canada was the destination of shipments of 90,289 tons of iron and steel products in January, or 32.9 per cent of the total. Japan was the second largest buyer, taking 37,515 tons; while exports to Italy were 14,799 tons; Venezuela, 12,684 tons. Argentina, 12,260 tons; and Poland, 10,029 tons.

Export gains of 52,500 tons in January were well scattered. Italy showed the largest increase, 11,029 tons. Argentina took 5700 tons more; Venezuela, 3000 tons more; British West Indies, 4800 tons more; Canada, nearly 3000 tons more; China, 4150 tons more; Dutch East Indies, 5000 tons more; Philippines, 2200 tons more.

Of the 9221 tons of plain shapes imported in January, 5541 tons came from Belgium, 2048 tons from Germany and 1597 tons from France. Sweden supplied 1085 tons of the 3134 tons of steel bars imported, while 921 tons came from Belgium, 652 tons from France and 350 tons from Germany. France provided 2618 tons of the 2760 tons of cast iron pipe imported and 101 tons came from Germany.

Ferromanganese imports, amounting to 5502 tons, came principally from Canada, 2312 tons; Norway, 2204 tons; and the United Kingdom, 855 tons. Brazil supplied 13,763 tons of the 15,344 tons of manganese ore imported, and 1560 tons came from India.

Canada took first rank as the supplier of imports in January, the total

coming from that country being 10,911 tons. Belgium provided 9339 tons; the United Kingdom, 7471 tons; and India, 7315 tons, all of the latter being pig iron.

In connection with the import totals for the three months shown in the table, the smallest of which was less than 7 per cent below the largest, a new lineup of products may be seen. In January there was a reduction, compared with a year ago, of 39 per cent in the amount of rolled and finished steel imported. Meantime our imports of pig iron and ferroalloys showed an increase of corresponding proportions.

Small Electric Locomotive Shipments Fell in 1928

Shipments of mining and industrial electric locomotives in the fourth quarter of 1928 totaled 184 units, with a value of \$1,149,678, according to Department of Commerce reports from 10 firms. This is the greatest number since the third quarter of 1927 and the highest value since the first quarter of that year.

As a year, 1928 fell far behind both 1927 and 1926, as shown in the table.

Shipped in	Number	Value
1926	941	\$4,551,919
1927	882	4,191,113
1928	569	3,468,070

High Records Established in Steel Furniture

WASHINGTON, March 5.—Orders for steel furniture in the "business group" in January were valued at \$3,905,906, against \$3,610,645 in December, according to reports received by the Department of Commerce from 34 manufacturers. Shipments increased to \$3,625,533 from \$3,117,139, while unfilled orders were \$2,579,055 and 2,409,985 respectively.

Orders for steel furniture in the "shelving group" in January were valued at \$1,099,039, compared with

\$828,555 in December, according to reports received from 16 companies. Shipments were valued at \$970,798 and \$791,376 respectively, while unfilled orders at the end of January were valued at \$819,387, compared with \$757,429 at the end of December.

Under both headings, the January figures are the highest ever recorded, not only as to value of new orders, but as to shipments and unfilled orders as well.

Industrial Stocks of Bituminous Coal

Stocks of bituminous coal in industries in the United States on Feb. 1 are estimated by the National Association of Purchasing Agents at 40,808,000 net tons. This shows a drop of only 1.6 per cent from the total on Jan. 1, and continues the practically uniform condition which has prevailed since last May. It is estimated that the stocks in general are adequate for 30 days' operation at present rate.

Peak Electricity Production

Production of electric power by public utility power plants in the United States made a new high record in January, far surpassing any figure previously established. In millions of kwhr., the total was 8219, compared with 7911 in December and with 7751 in November. The amount produced by water-power was less than in the two preceding months, being about 33 per cent of the total. The amount produced by fuels, 5503, was much the largest such amount ever reported.

On the daily average basis the January total was about 267. The previous high record was that of November, with 259. December was 257 and October of last year 256. No month earlier than last October was greater than 245. The figures are from the United States Geological Survey.

Highest Machinery Exports in 8 Years

Gain of 39 Per Cent Over December—Import Total Drops, but Still High—Heavy Shipments of Farm Implements

WASHINGTON, March 2.—Aggregating \$50,015,000, exports of machinery of all kinds in January, 1929, established an eight-year record, being the highest since January, 1921, when comparable figures were \$71,484,334, the highest for any month in the history of the industry. The second largest amount was shipped in December, 1920, with a total of \$64,133,824. Exports of machinery in December, 1928, amounted to \$36,249,833, while in January, 1928, the value was \$36,183,571.

Exports of industrial machinery in January, totaling \$22,396,486, as classified by the Division of Statistics, and \$20,776,000, as classified by the Industrial Machinery Division, Department of Commerce, set a seven-year record, but were only slightly larger than they were last November, with totals of \$22,045,468 and \$20,352,000 respectively. Similar exports in December, according to the Division of Statistics, totaled \$19,999,070.

Exports of machinery and vehicles in January reached the high total of \$99,913,769, against \$70,052,372 in January, 1928. Exports of power-driven metal-working machinery in

January were valued at \$2,089,542, against \$2,531,415 in January, 1928. Items listed in THE IRON AGE table totaled 1120 units, valued at \$1,382,176, compared with 716, valued at \$1,233,598, in December.

The gains in exports of machinery in January, over December and January, 1928, were in practically all classes. There was, however, a decline in exports of oil-well machinery from those of December and a falling off in exports of textile machinery when compared with January, 1928, but a gain over December.

Among the outstanding gains in exports of industrial machinery in January were those of pumps, steam locomotives, automobile engines and other internal combustion engines.

Imports of machinery and vehicles in January totaled \$2,891,397, against \$2,997,070 in December and \$1,744,396 in January of last year. Items listed in THE IRON AGE table were valued at \$2,206,164 in January, compared with \$2,480,863 in December and \$1,261,963 in January, 1928. Imports of industrial, office and printing machinery in January were valued at \$1,844,952, against \$2,068,867 in De-

cember and \$1,074,430 in January of last year.

Steel Shipbuilding in 1928

Merchant vessels built of steel and launched last year are reported by Lloyd's Register at 828 ships, aggregating 2,679,640 tons gross register. Of this amount 1,476,985 tons represented steamers, 1,180,842 tons motor ships, and 21,813 tons sailing vessels and barges.

The British Isles accounted for more than two-thirds of the steamers, with a total of 1,012,774 tons. British production of motor ships aggregated 427,801 tons, or something over one-third of the total. The United States accounted for only 33,467 tons of steamers, 28,085 tons of motor ships, and 13,705 tons of vessels without power, largely barges.

The thirty-ninth acetylene gas plant of the Prest-O-Lite Co., Inc., started operations in Houston, Tex., Feb. 2, 1929. A. J. Harrower is local superintendent.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	January, 1929	December, 1928	January, 1928
Locomotives	\$327	\$11	\$126
Other steam engines	97	93	70
Boilers	138	74	75
Accessories and parts	97	42	47
Automobile engines	858	596	745
Other internal combustion engines	839	665	631
Accessories and parts	292	269	256
Electric locomotives	108	292	373
Other electric machinery and apparatus	1,072	916	579
Excavating machinery	518	313	537
Concrete mixers	71	94	71
Road-making machinery	183	212	183
Elevators and elevator machinery	434	436	366
Mining and quarrying machinery	1,339	1,500	1,046
Oil-well machinery	1,170	1,821	985
Pumps	1,187	1,007	629
Bending and power presses	236	206	126
Forging machinery	135	57	90
Machine tools*	1,465	1,315	1,281
Rolling machines	135	32	58
Other metal-working machinery and parts	586	716	449
Textile machinery	1,119	1,066	1,216
Sewing machines	878	750	668
Shoe machinery	205	122	169
Flour-mill and gristmill machinery	76	95	37
Sugar-mill machinery	144	200	182
Paper and pulp-mill machinery	285	207	296
Sawmill machinery	71	67	67
Other woodworking machinery	188	187	212
Refrigerating and ice-making machinery	819	727	520
Air compressors	646	508	355
Typewriters	2,000	1,867	1,956
Power laundry machinery	220	140	59
Typesetting machines	612	579	462
Printing presses	562	496	397
Agricultural machinery and implements	12,420	9,426	7,855
All other machinery and parts	18,483	9,146	13,010
Total	\$50,015	\$36,250	\$36,184

*Principal details are shown in another table.

Exports of Power-Driven Metal-Working Machinery

	January, 1929		December, 1928	
	No.	Value	No.	Value
Engine lathes	72	\$181,807	50	\$81,454
Turret lathes	46	91,546	45	116,780
Other lathes	63	78,026	84	147,360
Vertical boring mills and chucking machines	36	29,915	6	20,587
Thread-cutting and automatic screw machines	107	135,100	82	109,560
Knee and column type milling machines	41	130,459	19	47,254
Other milling machines	65	110,947	47	172,647
Gear-cutting machines	33	84,235	45	102,470
Vertical drilling machines	36	28,529	20	12,138
Radial drilling machines	10	19,381	5	8,633
Other drilling machines	287	36,359	87	65,634
Planers and shapers	51	102,667	24	56,293
External cylindrical grinding machines	143	154,946	65	134,653
Internal grinding machines	45	144,248	33	82,703
Metal-working tool-sharpening machines	85	54,011	104	75,432
Total	1,120	\$1,382,176	716	\$1,233,598

Imports of Machinery Into the United States

(By Value)

	January, 1929	December, 1928	January, 1928
Metal-working machine tools	\$79,808	\$62,182	\$56,628
Agricultural machinery and implements	413,667	455,977	402,515
Electrical machinery and apparatus	176,290	165,904	97,055
Other power-generating machinery	91,949	46,071	64,960
Other machinery	987,962	1,439,407	470,409
Vehicles, except agricultural	456,488	311,322	170,396
Total	\$2,206,164	\$2,480,863	\$1,261,963

Machinery Markets and News of the Works

Heavy Buying Continues

Machine Tool Industry Had Large Volume in February and Activity Promises to Extend Through March

THE volume of machine tool orders continues heavy. February sales were larger than those of January for many in the trade, and the increasing amount of pending business clearly indicates that the present high rate of activity will extend at least through March. Companies affiliated with the automobile industry have been buying liberally, but, as in recent months, orders are coming from many sources.

The Fisher Body Corporation and the Murray Body Corporation have added extensively to their recent large purchases. Other purchasers in the automotive field were the Hupp Motor Car Corporation, Detroit, and the Winton Engine Works, Cleveland. There is considerable activity also among the Akron, Ohio, rubber companies. The Goodyear Tire & Rubber Co. and the Firestone Tire & Rubber Co. have each bought a number of machines. In the airplane

industry, the principal buying was by the Curtiss Flying Service, which ordered about 20 tools, mostly drilling machines, for repair work at Garden City, L. I. The American Cirrus Engines, Inc., Belleville, N. J., has bought a number of machines.

One of the outstanding orders of the week was for 24 small engine lathes, placed by an Eastern manufacturer with a Cincinnati tool builder. Another order was for 11 engine lathes for Government scout cruisers. Six special lathes will be built for a company in Iowa. A roller bearing company has ordered 35 internal grinding machines.

Foreign business is growing. A Cleveland manufacturer has sold 15 turret lathes for shipment to England. The Amtorg Trading Corporation, New York, has begun the placing of orders for equipping a farm tractor plant in Soviet Russia, and much business is expected.

New York

NEW YORK, March 5.—Machine tool buying continues at a high rate. Not only was February business larger than that of January for most of the sellers in this market, but the volume of orders in the first few days of March and the amount of buying immediately in prospect give promise that this month will keep up to the rate of the first two months of the year.

The Curtiss Flying Service placed orders for about 20 tools, of which 12 were small drilling machines. These machines are to be used for airplane repair work at Garden City, L. I. The American Cirrus Engines, Inc., Belleville, N. J., has placed orders for a few tools, but as most of its production will be an assembly job no large buying is looked for from this new airplane engine manufacturer. The Amtorg Trading Corporation, 165 Broadway, New York, has begun the placing of orders for tools for a new farm tractor plant in Soviet Russia. Orders from the General Electric Co. against a recent in-

quiry for about 75 tools are expected within the next week or two.

Packard Motor Car Co. of New York, Broadway and Sixty-first Street, has purchased block of property on Central Avenue, Newark, 200 x 243 ft., for three-story factory branch, service and repair plant with foundations for three additional stories later, to cost \$250,000. It is understood that plans will be drawn by Albert Kahn, Inc., Marquette Building, Detroit, architect.

United Metal Box Co., 473-91 President Street, Brooklyn, is taking bids on general contract for two-story addition, to cost about \$50,000 with equipment. M. Joseph Harrison, 63 Park Row, New York, is architect.

Anchor Cap Corporation, 59 East Eighth Street, New York, manufacturer of metal caps for bottles and capping machines, is planning early removal of plant of American Metal Cap Co., 2 Summit Street, Brooklyn, recently acquired, to its main operating unit, Anchor Cap & Closure Corporation, Long Island City, where production will be consolidated. Last noted plant will be enlarged. Parent company is arranging for sale of additional stock, proceeds to be used in part for expansion.

Procter & Gamble Co., Port Ivory, S. I., has awarded general contract to H. K. Ferguson Co., Cleveland, for one, two and four-story addition to soap manufacturing plant, to cost more than \$75,000 with equipment.

Franklin, Bates & Heindsmann, 2526 Webster Avenue, New York, architects, have asked bids on general contract for two-story automobile service, repair and garage building, to cost about \$100,000 with equipment.

Armstrong Seadrome Development Co., care of Henry J. Gielow, Inc., 25 West Forty-third Street, New York, naval architect, recently formed by Edward R. Armstrong and associates, has plans for floating airport about 300 miles from coast in Atlantic Ocean between New York and Bermuda, consisting of steel platform, 400 x 1200 ft., anchored by chain cables 21,150 ft. long, attached to special anchors. Landing field, machine shop and other structures will be located on floating airport, to cost \$1,500,000. Unit will be first of series of eight to be located along Azores air route to Europe, architect noted is in charge of project.

Lily-Tulip Cup Corporation, New York, recently organized with capital of \$1,000,000 and 250,000 shares common stock, no par value, has taken over Tulip Cup Corporation, College Point, L. I., and Public Service Cup Co., 167 Forty-first Street, Brooklyn, both manufacturers of paper cups and kindred containers. Company has leased space in building at Lexington Avenue and Forty-first Street, New York, for headquarters. Both plants will be continued in service and block of stock will soon be sold to be used in part for expansion.

L. R. Mack Motors Co., 256 Washington Avenue, Albany, N. Y., is having revised plans drawn for two-story service, repair and garage building to cost about \$225,000 with equipment. Fuller & Robinson, 95 State Street, are architects.

Century Carbon Co., 253 Front Street, New York, has acquired natural gas properties near Crew Lake, Richland Parish, La., and plans carbon black producing plant to handle about 20,000,000 cu. ft. of gas daily, entire development to cost over \$400,000 with air compressors and other power equipment.

Board of Education, Amsterdam, N. Y., is considering installation of manual training equipment in high school on Brandt Place, to cost \$550,000, for which plans will be drawn by H. F. Daly, 15 East Main Street, architect, bids to be asked on general contract in about 60 days.

Standard Underground Cable Co., 26 Washington Street, Perth Amboy, N. J., and Pittsburgh, has plans for addition to plant on site formerly occupied by Perth Amboy Dry Dock Co., one story, to cost more than \$200,000. Company is subsidiary of General Cable Co., 420 Lexington Avenue, New York.

Bids will be asked at once on general contract by Middlesex County Board of Vocational Education, Easton Avenue,

New Brunswick, N. J., for three-story vocational school unit, to cost about \$225,000 with equipment. Alexander Merchant, 52 Paterson Street, is architect.

Arcturus Radio Tube Co., 253 Sherman Avenue, Newark, manufacturer of radio tubes and equipment, is arranging for expansion. Company is disposing of stock issue to total \$4,950,000, part of fund to be used for program.

Bridgeport Brass Co., Bridgeport, Conn., has leased building at 255 Jelliff Avenue, Newark, for new factory branch and distributing plant.

Sonatron Tube Co., 88 Eighth Avenue, Newark, manufacturer of radio tubes and equipment, has leased, with option to purchase, a five-story factory at Chicago, 100 x 200 ft., for new branch plant. Company has also secured adjoining property and contemplates erection of addition.

Board of Education, Hasbrouck Heights, N. J., is said to be planning installation of manual training department in new two-story high school to cost \$500,000, for which plans are being drawn by Tooker & Marsh, 101 Park Avenue, New York, architects.

Blue Devil Fire Extinguisher Co., 469 Broad Street, Newark, N. J., has been organized to manufacture fire extinguisher for use on automobiles and motor boats. Company has factory in East Tenth Street, New York, and is in production.

New England

BOSTON, March 4.—Machine tool dealers report a falling off in demand both in orders and inquiries for new tools. It is the opinion of some that deliveries have become so extended that executives have either abandoned for the time plans for new equipment, or have turned to the used tool market in the hope of securing machines needed. Supplies of good conditioned used tools are limited, however, and actual sales are few. A number of small used tool room lathes, hand milling machines and shapers were sold the past week to shops throughout New England.

Texas Co., 31 St. James Avenue, Boston, will soon ask bids on a warehouse, garage, repair shop and small pump house at Chelsea, Mass.

Fred A. Webster, 51 West Main Street, Waterbury, Conn., architect has closed bids on an addition and alterations for Blake & Johnson Co., 1495 Thomaston Avenue, Waterville, Conn., machinery.

Property of Bozart Rug Co., Plainfield Street, Springfield, Mass., has been sold to Duckworth Chain & Mfg. Co. of that city, which plans to move part of its manufacturing equipment from present location to new plant.

Strand & Sweet Mfg. Co., Winsted, Conn., enamel wire, has merged with Polymet Corporation, New York, and will be known hereafter as the Strand & Sweet division. Polymet Corporation plans to triple the output of Winsted works.

New Departure Mfg. Co., Bristol, Conn., has begun construction of five-story addition to local plant, 128 x 404 ft. Work will be supervised by Lockwood, Greene Engineers, Inc., Boston. Contract has been let for 120-ft. section of new wing to Aberthaw Co., Boston, and construction of remaining section will begin after first has been completed. Lockwood, Greene Engineers, Inc., has also prepared plans

The Crane Market

INQUIRY for electric overhead cranes continues fairly active, but locomotive crane business is quiet. The Chase Brass & Copper Co., Waterbury, Conn., is expected to close this week for its list of six overhead cranes. The Baltimore & Ohio Railroad is in the market for a 50-ton locomotive crane.

Among recent purchases are:

Dwight P. Robinson & Co., New York, 50-ton, 4-motor overhead crane for export to Havana, Cuba, from Ohio builder.

Viscose Co., Marcus Hook, Pa., 40-ton, 1-motor overhead crane from unnamed builder.

Northern Pacific, Laurel, Mont., 25-ton overhead electric crane from Shaw Electric Crane Works.

Nashville Bridge Co., Nashville, Tenn., 10-ton overhead crane from Shaw Electric Crane Works.

for addition to Meriden division of New Departure company, which will be 108 x 220 ft., four stories.

George F. Crouch, Inc., Middletown, Conn., has been organized to build and design boats and deal in marine engines and supplies. Company will operate yard and shop on Connecticut River opposite Middletown.

United Illuminating Co., New Haven, Conn., has plans for an addition to steam-operated electric generating plant at Steel Point, Bridgeport, Conn., to cost more than \$300,000 with equipment. Westcott & Mapes, New Haven, are engineers. Company also has plans for one-story equipment storage, service and distributing plant on East Main Street, Bridgeport, 118 x 225 ft., to cost over \$100,000 with equipment. Frederick J. Dixon, Bridgeport, is architect.

Spartan Saw Works, Inc., Fish Avenue, Springfield, Mass., has plans for one-story unit to cost about \$35,000 with equipment. P. B. Johnson, 1562 Main Street, is architect.

Bulova Watch Co., Providence, R. I., manufacturer of watch and clock movements, has arranged for preferred stock issue to total \$2,500,000, part of proceeds to be used for extensions and improvements.

Board of Education, Pawtucket, R. I., plans installation of manual training department in junior high school in Darlington section to cost \$500,000. Monahan & Melkle, Pawtucket, are architects.

Hartford Electric Light Co., 266 Pearl Street, Hartford, Conn., has plans for three-story equipment storage and distributing building, with service and repair departments, 160 x 180 ft., to cost more than \$150,000 with machinery. Smith & Bassette, Hartford, are consulting architects. F. J. Reynolds is company engineer.

Jenney Mfg. Co., 8 India Street, Boston, manufacturer of refined oils, has purchased 140,000 sq. ft. on Marginal Street, Chelsea, as site for new oil and gasoline storage and distributing plant, to cost more than \$80,000 with equipment.

J. C. Barrett Co., 516 Asylum Street, Hartford, Conn., manufacturer of metal patterns, etc., has acquired two acre tract at Elmwood, and plans construction of two-story plant, 40 x 100 ft., for production of aluminum plate products, to cost about \$40,000 with equipment.

Norton Co., Worcester, Mass., will

make extensions to its abrasive works, including building, 48 x 150 ft., five stories, to house a crushing mill and other equipment for preparation of abrasives, and a four-story addition, to grain storage building, 50 x 108 ft.

James M. Morton and A. S. Cann have organized C. & M. Metal Products Corporation, Springfield, Mass., to manufacture stampings and pressed metal work generally. They are at present equipped for small and medium size stampings.

Philadelphia

PHILADELPHIA, March 4.—Contract has been let by John J. Nesbitt, Inc., State Road and Rhawn Street, Philadelphia, manufacturer of ventilating equipment, etc., to Harry Gill, Jr., 2515 Germantown Avenue, for one-story addition, 1108 x 1142 ft., to cost over \$80,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Consolidated Instrument Co. of America, Ltd., 305 East Forty-seventh Street, New York, has acquired Aircraft Control Corporation, 3246 Ludlow Street, Philadelphia, manufacturer of apparatus for automatic steering and control of aircraft, and will merge with organization. Company will be operated as a division of purchasing corporation. Consolidated company recently acquired Julian J. Friez & Sons, Baltimore, manufacturer of engineering and aeronautical instruments, and Moulded Insulation Co., Mount Vernon, N. Y.

Childs Auto Body Co., Philadelphia, has leased one-story building at 1410-16 Melon Street, for new automobile body-building and repair works.

Sun Oil Co., Finance Building, Philadelphia, is carrying out expansion program at Marcus Hook refinery, including installation of tanks and other equipment for storage and distribution. Work is under way on construction of pipe line to Twin Oaks, where a new storage and distributing plant will be located, including 30 steel tanks, pumping and auxiliary equipment. Expansion is reported to cost over \$500,000.

Board of Freeholders, Trenton, N. J., has authorized expansion program at Mercer airport, including immediate purchase of 71 additional acres, making total field of 211 acres. Project will include hangars, repair and reconditioning shops, oil storage and other buildings. Harry F. Harris is County engineer, in charge.

Scott Paper Co., Chester, Pa., has plans under way for power plant, to cost about \$50,000 with equipment. C. M. Howell, Chester, is engineer.

Dictatype Co., Inc., Sixteenth and Claymont Streets, Wilmington, Del., manufacturer of stenographic machines and parts, is planning construction of new plant, to cost more than \$40,000 with equipment.

Lehigh Valley Coal Co., Wilkes-Barre, Pa., has plans for new all-steel electrically-operated coal breaker at Dorrance, Pa., colliery, to cost about \$1,000,000 with machinery.

John J. and William A. Schneider, Scranton, Pa., have organized Schneider Brothers, with capital of \$60,000, and plan operation of local factory to manufacture plumbing equipment and supplies.

Erie Railroad Co., 50 Church Street, New York, is planning for extensions and improvements in car shops at Susquehanna, Pa., in connection with 1929 expansion program, including rebuilding several existing units and construction

of additional buildings, to cost more than \$400,000 with equipment. It is purposed to later develop local shops to handle passenger car work now carried out at plants at Buffalo, Hawthorne and Kent, Ohio, and to remove these shops to that location before close of year.

Lansdale Brick Co., Lansdale, Pa., will soon take bids for new one-story manufacturing unit, 55 x 300 ft., to cost more than \$70,000, with presses, conveyors and other equipment. F. M. Weaver, Lansdale, is engineer; H. E. Dinker, Penbrook, Pa., is president.

Chambersburg Engineering Co., Chambersburg, Pa., manufacturer of hydraulic machinery, metal-working equipment, etc., has plans for one-story machine shop to cost about \$130,000 with equipment. Completion is scheduled in May.

South Atlantic

BALTIMORE, March 4.—Philip L. Small & Associates, Terminal Tower Building, Cleveland, architects and engineers, have plans for initial units of new plant of Glenn L. Martin Co., manufacturer of airplanes, to be located near municipal airport, Baltimore, to cost more than \$1,000,000 with machinery.

Standard Paper Mfg. Co., Canal and Hull Streets, Richmond, Va., has plans for addition to mill No. 3, with installation of paper-making machinery and accessory equipment, to cost about \$450,000.

Victory Products Corporation, Hagerstown, Md., R. J. Funkhauser, president, manufacturer of cold storage doors and kindred equipment, has acquired factories at Winchester, Va., and plans establishment of branch plants; existing units will be enlarged.

Chesapeake & Ohio Railway Co., Richmond, Va., has awarded general contract to United Engineers & Constructors, Inc., 112 North Broad Street, Philadelphia, for extensions in locomotive shops at Huntington, W. Va., including rebuilding of several units, to cost \$3,490,000 with equipment; also let contract to Hughes-Foulkrod Co., 421 Seventh Avenue, Pittsburgh, for new shops at Russell, Ky., for freight car construction and repairs, to cost \$3,160,000.

W. F. Dunn & Son Marine Railway, West Norfolk, Va., plans rebuilding portion of machine shop recently destroyed by fire. New tools will be installed.

Chemical Warfare Service, Edgewood Arsenal, Md., will receive bids until March 15 for one 6-in. pipe-threading and cutting machine.

Draper Corporation, Hopedale, Mass., manufacturer of cotton mill machinery, has awarded general contract to Fiske-Carter Construction Co., Masonic Temple Building, Greenville, S. C., for two-story and basement factory branch and distributing plant, 100 x 264 ft., at Spartanburg, S. C., to cost more than \$75,000 with equipment. J. E. Sirrine & Co., Greenville, are engineers.

du Pont Rayon Co., River Road, Buffalo, has begun superstructure for machine shop and power plant at new mill at Waynesboro, Va., and will soon arrange for equipment installation. Entire project will cost about \$4,000,000.

Water Department, Municipal Office Building, Baltimore, E. G. Rost, engineer, plans call for bids in about 90 days for new municipal central pumping plant at Druid Hill Park, to cost \$600,000 with machinery. J. H. Gregory, Johns Hopkins University, Charles Street, is consulting engineer.

Virginia-Carolina Power Co., operated

by Virginia Electric & Power Co., 700 East Franklin Street, Richmond, Va., has plans at office of Stone & Webster Engineering Corporation, 49 Federal Street, Boston, engineer, for hydroelectric power plant for which application recently was made. It will have ultimate output of 25,000 kw. and will cost more than \$6,000,000 with transmission system.

Robert & Co., Atlanta, Ga., architects and engineers, have been engaged to prepare plans for a cotton mill near Dalton or Bremen, Ga., for company whose name is temporarily withheld, to include power house, pumping plant, machine shops and other mechanical units, project to cost over \$4,000,000 with equipment.

Richmond Sand & Gravel Co., Richmond, Va., affiliated with Norfolk Sand & Gravel Co., Norfolk, Va., is said to be planning new sand and gravel storage and distributing plant to cost more than \$250,000, including conveying, loading and other equipment.

D. C. Elphinstone, Inc., 120 South Calvert Street, Baltimore, has been appointed district representative in Maryland district for Dayton-Dowd Co., Quincy, Ill., manufacturer of centrifugal pumps. Pump division sales will be in charge of W. C. Reamy, Jr.

Chicago

CHICAGO, March 4.—Local machine tool dealers estimate January and February sales to be equal to the first five months of last year. The outlook for March is for a good volume of business though it is changing in character from large rather generally broadcast statements of needs to quiet inquiries and purchases of one and two tools. Deliveries are influencing sales to a greater degree and buyers in seeking nearby shipments are less inclined to demand certain types and makes of equipment. Makers of tool-room equipment report increasing sales, while manufacturers of heavy machine tools find orders more difficult to obtain.

Bids on recent railroad inquiries have been submitted and it is reported that the Chicago, Milwaukee, St. Paul & Pacific will soon place orders. The Illinois Central will buy a sensitive drill. The Nash Motors Co., contemplates adding to equipment at its Racine, Wis., plant.

Allegheny Steel & Brass Corporation, 549 West Washington Boulevard, Chicago, has been appointed sales agent in Chicago territory for Keystone Steel & Wire Co., Peoria, Ill.

Triner Scale & Mfg. Co., Twenty-first Street and Fairfield Avenue, Chicago, is erecting a four-story addition, 125 x 145 ft., to cost \$250,000.

Krone-Sebek Die Casting & Mfg. Co., Chicago, has moved from 64 West Austin Avenue to new building at corner of West Forty-seventh Street and Richmond Avenue, recently purchased containing 54,000 sq. ft. of floor space.

Roberts Portable Oven Co., 853 North Avenue, Chicago, has leased one-story factory at 6525 South Laurel Avenue, totaling about 17,000 sq. ft. floor space, for new plant. Possession will be taken April 1.

Economy Scaffold Co., 4619 Fulton Street, Chicago, is considering one-story plant at Broadview, Ill., to cost about \$25,000 with equipment.

Hopper Paper Co., Taylorville, Ill., is reported planning new pulp and paper mill on neighboring site for manufacture

of bond papers under patents controlled by Cornstalks Products Co., Danville, Ill., to cost over \$1,500,000 with machinery. F. H. Masselink is general manager.

City Council, Owatonna, Minn., is asking bids until April 8 for turbine engine and auxiliary equipment for municipal electric light and power plant, to cost about \$50,000.

Vesta Battery Corporation, Twenty-first Street and Indiana Avenue, Chicago, manufacturer of storage batteries and kindred equipment, has secured property at Narragansett Avenue and West Sixty-fifth Street, as site for one-story plant, totaling about 100,000 sq. ft. floor space, to cost more than \$250,000 with equipment. Present works will be removed to new location.

White Star Refining Co., Wood River, Ill., has disposed of common stock issue to total \$7,200,000, part of proceeds to be used for expansion, including completion of new oil refinery at Trenton, Mich., to have capacity of 250,000 gal. of crude oil per day.

Central Power & Light Co., Dubuque, Iowa, is said to be planning new steam-operated electric light and power plant at Harvey, N. D., to cost about \$150,000 with equipment.

City Council, Great Falls, Mont., is planning one-story municipal machine and repair shop, 60 x 75 ft., to cost about \$30,000 with equipment. M. L. Morris, Great Falls, is city engineer, in charge.

Triplex Washing Machine Co., Lake and Des Plaines Streets, Chicago, has leased one-story factory at 2409-21 Oakley Avenue, totaling about 20,000 sq. ft. floor space, for new plant. Company is arranging further expansion, including establishment of two new assembling plants in neighboring cities, and new plant in Canada. Thomas J. Casey is president.

Pittsburgh

PITTSBURGH, March 4.—Plans have been filed by Pittsburgh Piping & Equipment Co., Forty-third Street and Allegheny Valley Railway, Pittsburgh, for one-story addition to cost about \$30,000.

Aluminum Co. of America, Inc., Oliver Building, Pittsburgh, has plans for new mill at Alcoa, Tenn., for production of bronze powders and kindred products, to cost more than \$700,000 with machinery.

Sylvania Products Co., Emporium, Pa., manufacturer of radio apparatus and electrical equipment, will take bids this month for two-story addition, to cost about \$140,000 with machinery. E. White is company engineer.

Kendall Refining Co., Bradford, Pa., will carry out expansion program at oil refinery, to cost more than \$200,000 with equipment. Capacity will be doubled.

Lawrence Motor Co., Mercer Street, New Castle, Pa., has asked bids on general contract for four-story service, repair and garage building, to cost about \$150,000 with equipment. W. C. Eckles Co., Lawrence Savings & Loan Building, is architect.

Johnson Bronze Co., New Castle, Pa., has work in progress on expansion program for increase in output of bronze bushings and kindred products, consisting of foundry, molding department and other units, to cost about \$85,000 with equipment. Completion is scheduled in April.

National Foundry Co., Erie, Pa., manufacturer of steel castings, etc., has acquired plant and business of Williams Foundry & Machine Co., Akron, Ohio,

specializing in machinery and castings for rubber mills, and will consolidate. Akron works will be discontinued and production will be concentrated at Erie where capacity will be increased.

Board of Public Education, Administration Building, Bellefield Avenue, Pittsburgh, will receive bids until March 14 for manual training machinery, steel lockers, etc. H. W. Cramblet is secretary.

Erie Foundry Co., Erie, Pa., maker of sheet mill machinery, has purchased Beaudry line of motor-driven air hammers from Beaudry Co., Inc., Boston. Erie company plans to build hammers in sizes up to 2500 lb. capacity.

Cleveland

CLEVELAND, March 4.—The volume of machine tool sales continues heavy. February showed a gain over January and March has started out with a good volume of inquiry. While most of the business is coming directly or indirectly from the automotive industry, there is a good demand from widely distributed sources. The Hupp Motor Car Corporation, Detroit, which recently started to buy equipment to manufacture a new line of cars in its Chandler-Cleveland plant, purchased a number of multiple spindle drilling machines the past week and is in the market for other equipment. The Winton Engine Works, Cleveland, purchased five or six machines. Timken Roller Bearing Co. has recently ordered 35 internal grinding machines.

There is considerable activity in rubber tire plants in Akron. The Goodyear Tire & Rubber Co. purchased five lathes the past week and the Firestone Tire & Rubber Co. several machines. A Cleveland manufacturer of turret lathes received an order from a dealer in England for fifteen machines. Demand for turret lathes and single machines is still heavy.

Deliveries are more extended on many lines of machine tools, although some manufacturers, have speeded up production to obviate long deliveries.

Geometric Stamping Co., Cleveland, has placed a contract with Austin Co. for a new plant at St. Clair Avenue and East 200th Street, to cost about \$500,000. It will include a one-story building, 250 x 400 ft., with monitor roof, and another structure, 60 x 130 ft., for plating and annealing department.

Contract has been let by Cleveland Worm & Gear Co., 3249-99 East Eightieth Street, Cleveland, to A. M. Higley Co., Plymouth Building, for one-story addition, 35 x 100 ft., to cost about \$50,000 with equipment.

Hoover Suction Sweeper Co., North Canton, Ohio, manufacturer of vacuum cleaning equipment, is considering construction of two new four-story units, one for general production and other for engineering, service division and similar operations, to cost more than \$225,000 with equipment. Company recently arranged for increase in capital from 20,000 to 140,000 shares of common stock, no par value.

Mather Auto Service Co., 130 South Freedom Street, Alliance, Ohio, local representative for Falcon, Stearns and other automobiles, has plans for three-story service, repair and garage building, to cost about \$100,000 with equipment.

Electric Auto-Lite Co., Toledo, Ohio, manufacturer of automobile lighting and starting equipment, battery units, etc.,

has purchased adjoining property with three buildings, and will use for expansion, project to cost more than \$350,000 with equipment. One unit will be used for production of motor parts, and others for regular company specialties.

Officials of City Machine & Tool Co., Toledo, Ohio, have organized City Auto Stamping Co., with capital of 150,000 shares of stock, no par value, to be closely affiliated with first noted company. New organization contemplates plant for production of heavy steel and other metal stampings, including automobile bodies, radiator shells, fenders, etc.

Plant of McMyler-Interstate Co., Bedford, Ohio, manufacturer of locomotive cranes, coal and ore-handling machinery, etc., will be offered at public sale by P. A. Connolly, receiver, March 29. Court has fixed upset price of \$500,000 for real estate and buildings, exclusive of equipment.

Cincinnati

CINCINNATI, March 4.—A large amount of business has been placed with local machine tool builders the past week with the result that February sales were considerably in excess of those in January. At least four important manufacturers report the past month's bookings as the best since the war. Companies affiliated with the automobile industry have been heavy buyers. The Fisher Body Corporation has added substantially to previous purchases, and the Murray Body Corporation has contracted for a large quantity of tools. Orders have been well diversified and have come from the electrical, airplane and agricultural implement industries. A Cincinnati builder has sold eleven engine lathes for Government scout cruisers, and another company has booked twenty-four small engine lathes for delivery to an Eastern manufacturer. Six special lathes are to be supplied by a local plant to an industrial company in Iowa.

Much interest is centered on foreign markets, particularly Russia. The Soviet Government at Moscow, through the Amtorg Trading Corporation, New York, is expected to buy an extensive list of machine tools, including two 20-in., one 28-in., and two 36-in. engine lathes; also one 14-40-in. and one 26-78-in. extension bed gap lathes. These tools are to be motor-driven. There is another large Russian inquiry upon which action is looked for within the next 10 days.

Almost without exception machine tool shops in this city are operating overtime in an effort to give reasonable deliveries on present orders, some departments maintaining a 24 hr. schedule. The few shops which have not shared liberally in the large volume of business recently are busy on orders for those which are unable to take care of all current bookings in their own plants. Indications are that the heavy run of bookings will continue during the next 30 days.

Wessling Brothers Foundry Co., Liberty and McLean Streets, Cincinnati, has purchased American Foundry & Machine Co., Hamilton, Ohio, and will remove operations to latter plant. A. G. Wessling is general manager.

Excavations are being started by Cincinnati Milling Machine Co., Cincinnati, manufacturer of machine tools, for one-story addition to cost about \$80,000, for which general contract recently was let to Austin Co.

Dayton Airplane Engine Co., Dayton, Ohio, recently organized to take over plant and business of Dayton Engine Co., is disposing of stock issue to total \$660,000, part of proceeds to be used for expansion. It is proposed to develop capacity of ten complete engine units daily.

Commerce Garage Co., Fourth and Race Streets, Cincinnati, has plans for six-story addition to service, repair and garage building, to cost \$175,000 with equipment. Hillsmith Co., Inc., Chamber of Commerce Building, is architect and engineer.

Miami-Holiday Steel Co., Dayton, has plans for one-story storage and distributing plant, to cost about \$150,000 with equipment.

Board of Education, Springfield, Ohio, is considering installation of manual training equipment in new junior high school to cost about \$260,000, for which plans will be drawn by Eastman & Budke, First National Bank Building, architects.

Crosley Radio Corporation, Colerain and Sassafras Streets, Cincinnati, has asked bids on general contract for eight-story addition, to cost about \$500,000 with equipment. Samuel Hannaford & Sons, Dixie Terminal Building, are architects.

St. Louis

ST LOUIS, March 4.—Bids will soon be asked by South Side Machine Co., 4016 Nebraska Avenue, St. Louis, for one-story machine shop, to cost about \$40,000 with equipment. Leonard Haeger, 3844 Utah Place, is architect.

Missouri Pacific Railway, Railway Exchange Building, St. Louis, has taken bids on general contract for one-story addition to engine house, 120 x 300 ft., at Osawatimie, Kan., to cost about \$50,000 with equipment. E. A. Hadley is chief engineer.

Eagle-Picher Lead Co., St. Louis, is arranging an expansion and improvement program at properties at Galena and Smelter Hill, Mo., to include installation of additional furnace equipment and one-story sheet lead mill, to cost about \$275,000 with equipment. Plant at Joplin, Mo., will be developed strictly as a lead fabricating mill in future. Company engineering department is in charge. Headquarters are at 134 North La Salle Street, Chicago.

City Council, Kansas City, Kan., has plans for one-story municipal power house, to cost about \$350,000 with machinery. Arthur L. Mullergren, Board of Trade Building, Kansas City, Mo., is consulting engineer. R. Swope, City Hall, is city engineer.

City Council, McCook, Neb., is considering installation of municipal electric light and power plant, to cost about \$135,000 with equipment.

Common Council, Lawton, Okla., is completing plans for purchase of 320-acre tract for municipal airport, and will build hangar, repair and reconditioning shop and other buildings, to cost \$35,000.

Globe Refining Co., Cushing, Okla., is planning for addition to oil refinery, including high pressure stills and auxiliary equipment, with enlarged storage and distributing facilities, to cost about \$400,000 with equipment. O. D. Gurley is general superintendent.

Century Electric Co., St. Louis, has opened district sales office in Union State Bank Building, Omaha, Neb., and will carry line of motors and fans.

Parks Aircraft, Inc., East St. Louis, Ill., manufacturer of a cabin monoplane, also will produce a line of open biplanes. Five new ships have already been built, and production will be in full operation in two weeks.

Buffalo

BUFFALO, March 4.—Plans are under way by duPont Cellophane Co., River Road, Buffalo, manufacturer of transparent wrapping material, for new mill at Old Hickory, near Nashville, Tenn., to cost about \$1,500,000 with equipment. Company is a subsidiary of E. I. duPont de Nemours & Co., Wilmington, Del., and engineering department of last noted will supervise work.

J. F. Donovan, Auburn, N. Y., city manager, will receive bids until March 12 for electrically-operated pumping machinery for municipal waterworks, including one centrifugal pumping unit with capacity of 10,000,000 gal. per day, two pumps of 5,000,000 gal. daily, and one pump of 2,500,000 gal. per day, all direct-connected to slip-ring motors. Arthur J. Adams is chief engineer and superintendent of water department.

Board of Trustees, University of Rochester, 46 Prince Street, Rochester, N. Y., has awarded general contract to A. W. Hopeman's Sons Co., 569 Lyell Avenue, for one and three-story engineering building, to cost \$250,000 with equipment. Gordon & Kaelber, 311 Alexander Street, are architects.

Millard J. Roberts, 95 Scott Street, Tonawanda, N. Y., and associates, have organized Roberts Appliance Co., and plans establishment of plant at Buffalo to manufacture gas burners, heaters and kindred products.

Plans are being arranged for a merger of Wire Wheel Corporation of America, Inc., 1700 Elmwood Avenue, Buffalo, and Kelsey-Hayes Wheel Corporation, 3600 Military Avenue, Detroit, with branch plants at Jackson and Albion, Mich., and Memphis, Tenn. Consolidated company will continue present plants and will carry out expansion program.

Detroit

DETROIT, March 4.—Contract has been let by Warner Aircraft Corporation, 4042 West Jefferson Avenue, Detroit, manufacturer of airplane motors, to Krieghoff Co., 6601 French Road, for three one- and two-story units for new plant near municipal airport, to cost about \$400,000 with equipment. Christian W. Brandt, 2111 Woodward Avenue, is architect and engineer.

I. B. Bennett, president of Bennett Pump Corporation, Muskegon, Mich., and associates have organized Modern Equipment Co., to specialize in production of portable pumping units. Company will take over industrial division of O. E. Szekely Corporation, Holland, Mich., recently acquired by Mr. Bennett and Lorimer Dunlevy, formerly connected with Szekely organization, manufacturer of pumping and kindred equipment. Part of plant and equipment of March Automatic Irrigation Co., Muskegon, has been secured and will be used for initial production.

Ford Motor Co., Detroit, has awarded general contract to J. W. Butler Construction Co., Penobscot Building, for one-story addition to plant at Dearborn, Mich., 60 x 320 ft., to cost over \$150,000 with equipment.

Ainsworth Mfg. Corporation, Detroit, has been organized under State laws to take over plant and business of Ainsworth Mfg. Co., 256 Du Bois Street, manufacturer of metal stampings and machined products for automobiles. New company has arranged for stock issue to total about \$2,566,000, part of proceeds to be used for expansion.

Tomkins-Johnson Co., Jackson, Mich., manufacturer of tools, dies, milling cutters, etc., has completed an addition and plans to increase former capacity about one-third.

Macklin Co., Jackson, Mich., manufacturer of grinding wheels, has authorized an expansion program, to include construction of two new kilns and installation of additional equipment, to cost more than \$50,000.

Detroit Lead Pipe Works, Inc., 600 West Larned Street, Detroit, plans one-story addition for pipe manufacture, to cost about \$70,000 with equipment.

Grand Rapids Metalcraft Corporation, Grand Rapids, Mich., is considering new branch plant at Detroit to manufacture a ventilating heater unit, recently acquired through acquisition of Kelch Ventilating Heater Co., to cost more than \$60,000 with equipment.

Pneu-Hydro Road Machinery Co., Cadillac, Mich., has been organized to manufacture road planers of special design and deal in other types of road machinery and equipment. Company expects to purchase steel and malleable iron castings and some other parts and manufacture rest of machine in its own plant.

Federal-Mogul Corporation, Detroit, has established die-casting division for handling contract manufacture of die-cast parts in zinc, aluminum and tin base alloy. Automatic die-casting machinery has been installed and new division will eventually be housed in 25,000-sq. ft. addition which is being made to No. 1 plant in Detroit.

Indiana

INDIANAPOLIS, March 4.—Contract has been let by C. & G. Potts & Co., Inc., 840 Washington Street, Indianapolis, manufacturer of brick-making machinery and parts, to Mothershead & Fitton, 960 North Pennsylvania Street, for one-story addition to machine shop, including improvements in present unit, to cost about \$30,000.

Hamilton-Ross Factories, Inc., 736 Tilden Avenue, Chicago, manufacturer of lamps and kindred products, has plans for extensions in plant at Kokomo, including new unit and installation of additional equipment. One of present Chicago divisions will be removed to Kokomo. Project will cost about \$50,000.

United States Radio & Television Corporation, Marion, has awarded general contract to Bowman Construction Co., Marion, for two one-story additions to local Case radio plant, 145 x 230 ft., and 75 x 300 ft., to cost more than \$50,000. Company will remove present Apex plant at Chicago to Marion, where production will be concentrated. Headquarters are at 1340 South Michigan Boulevard, Chicago.

Showers Brothers Co., Bloomington, manufacturer of furniture, is planning new two-story unit, 100 x 142 ft., at branch plant at Bloomfield, to cost about \$100,000 with equipment.

Board of Education, 150 North Meridian Street, Indianapolis, is said to be planning installation of manual training

equipment in two-story junior high school, to cost about \$600,000, for which plans will be prepared by McGuire & Shook, 941 North Meridian Street, architects; Rotz Engineering Co., Merchants' Bank Building, is mechanical engineer.

Delco-Remy Corporation, Anderson, Ind., manufacturer of automobile starting and lighting equipment, etc., has acquired Butler Mfg. Co., Indianapolis, manufacturer of special aluminum pistons, piston rings, etc., and will operate as division. Charles R. Butler, heretofore president, will be in charge.

John Deere Plow Co., 1325 Third Avenue, Moline, Ill., has started superstructure for four-story addition, 100 x 100 ft., to branch plant at Fort Wayne, portion of structure to be used for storage and distribution, to cost about \$150,000 with equipment. General contract recently was let to Indiana Engineering & Construction Co., Fort Wayne.

Century Electric Co., St. Louis, has opened branch sales office at 718 Continental Bank Building, Indianapolis, and will carry stock of motors and fans.

Milwaukee

MILWAUKEE, March 4.—Demand for machine tools continues active and the volume of orders is well sustained. Despite the heavy buying by automotive plants in recent weeks, inquiry is still brisk. Business from other classes of industry is coming in a steady flow. As a rule, plants have not been able to make any headway toward balancing production with orders and are still far behind on deliveries.

Metal Stamping Co., West Bend, Wis., specializing in automotive parts, has acquired the two and three-story plant, 80 x 128 ft., of former Barton Axle Co., at Barton, and has abandoned plan of erecting a new shop. Transfer of present equipment and installation of considerable new machinery is expected to be completed by April 1. C. P. Davey is general manager.

White Rock Silica Co., Browntown, Wis., is about to make additions to equipment of its sand pit and handling plant. H. F. Stoll is manager.

Board of Vocational Education, Kenosha, Wis., has selected W. G. Ittner, architect, 911 Locust Street, St. Louis, to design new \$500,000 vocational school. Work will begin early in 1930. E. F. Randall, 6701 Fifth Avenue, is vocational director.

Kissel Motor Car Co., Hartford, Wis., contemplates extensive tooling to handle contract with Bradfield Motors, Inc., Chicago, for manufacture of taxicabs.

Motor Grinding Co., 489 National Avenue, Milwaukee, specializing in automobile engine reboring, is building a one-story shop addition, 40 x 75 ft., costing about \$25,000 with new equipment.

Industrial Controller Co., 306 Hanover Street, Milwaukee, recently merged with Square D Corporation, Detroit, placed general contract with Lupinski & Wolff, 290 Third Street, local, for a three-story shop addition, 50 x 140 ft.

Swift & Co., 33 South Clark Street, Chicago, will build a new two-story cold storage warehouse, 62 x 200 ft., at Oshkosh, Wis., to cost about \$100,000 with equipment.

Wisconsin Electric Co., Sixteenth Street and Junction Avenue, Racine, Wis., has changed its corporate style to Dumore Electric Co., to conform to its trademark.

on fractional horsepower motors. The capital stock also has been increased from 500 to 3000 shares of common without par value. Louis H. Hamilton is president, and Harry F. Nehoda, secretary and treasurer.

Kolinski Ready Mixed Concrete Co., Fifty-eighth and National Avenues, West Allis, Milwaukee, has leased 6000 sq. ft. of dock space from L. J. Petit Salt Co., foot of Twelfth Street, and will install considerable equipment.

Carryola Co. of America, 279 Walker Street, Milwaukee, subsidiary of Prime Mfg. Co., manufacturing portable phonographs, has been acquired by the Allen-Hough Mfg. Co., Racine, Wis., engaged in same line. A new corporation, Allen-Hough Carryola Co., has been organized, with Don T. Allen, president; George P. Hough, vice-president, and Gardner P. Allen, secretary-treasurer, all retaining same positions held in the Allen-Hough company. For the present both Milwaukee and Racine plants will be continued, but it is planned to consolidate operations at Milwaukee works. Production is being started on a new product, Allen-Hough rotor, a synchronous electric motor, 4 x 6 x 1 1/4 in., for portable phonographs and radio sets.

Gulf States

BIRMINGHAM, March 4.—In connection with new tire and tube plant at Gadsden, Ala., Goodyear Tire & Rubber Co., Akron, Ohio, has approved plans for multi-story rubber reclaiming mill, 100 x 380 ft., on adjoining site, to cost about \$1,000,000 with machinery.

Creola Carbon & Gasoline Corporation, care of B. A. Irwin, 2 Giddens Lane Building, Shreveport, La., secretary, recently formed with capital of \$500,000, has acquired property near Mangham, La., and plans new carbon black and gasoline plants, to cost more than \$300,000 with machinery. A pipe line will be constructed.

Texas Sulphur Co., J. W. Cain, Niels Esperson Building, Houston, Tex., president, has begun expansion program at properties in Palagana Dome section, Duval County, to more than double present capacity. Work will include installation of mining, power, pumping and other equipment, with conveying machinery, etc., and will cost more than \$150,000.

Firestone Tire & Rubber Co., Akron, Ohio, has awarded general contract to Walter J. Bryson Construction Co., Jacksonville, Fla., for factory branch, storage and distributing plant at Jacksonville, to cost about \$185,000 with equipment. Work will soon begin on similar unit at Miami, Fla., to cost about like sum.

West Florida Power Corporation, Jasper, Fla., has work under way on hydro-electric power plant near Jackson Bluff, about 25 miles from Tallahassee, to cost more than \$900,000 with transmission system.

Todd Shipyards Corporation, 25 Broadway, New York, has awarded general contract to Doullut & Erwin Co., Mobile, Ala., for extensions and improvements in plant at Mobile, including construction of 650-ft. outfitting dock, with repair facilities, to cost about \$250,000 with equipment.

Board of City Development, Sweetwater, Tex., has approved plans for new hangar, 80 x 100 ft., at municipal airport, with reconditioning and repair shop. A smaller hangar unit, 50 x 80 ft., will also be built. It is understood that board

is interested in purchase of standardized steel hangars of sizes noted. M. E. Owen is secretary.

Chevrolet Motor Co., Two Republics Building, El Paso, Tex., has awarded general contract to Ware-Ramey Co., 1614 East Missouri Street, for one-story factory branch, service and parts department, to cost about \$90,000 with equipment.

Transcontinental Oil Co., Fort Worth, Tex., is reported concluding purchase of 400 acre tract near Texas City, Tex., as site for new oil refinery, to handle about 30,000 bbl. of crude oil daily. Project will include separate unit for gasoline refinery, and construction of pipe line from oil properties in Pecos County, Tex., to refinery site, about 425 miles, to cost over \$12,000,000.

Magnolia Petroleum Co., Dallas, Tex., a subsidiary of Standard Oil Co. of New York, 26 Broadway, New York, will carry out expansion at Beaumont refinery, including additional machinery for crude oil handling, refining, gasoline cracking, pumping, and other service, and enlarged storage facilities, to cost more than \$2,500,000. Company will soon begin construction of 10-in. pipe line from terminal at Midland, Tex., to Winkler County, to cost about \$1,000,000.

Pacific Coast

SAN FRANCISCO, Feb. 28.—Plans are being drawn by Fraser Gas Furnace Co., 445 South San Joaquin Street, Stockton, Cal., for one-story plant, to cost about \$55,000 with equipment. Ralph P. Morrell, Union Building, is architect.

Western Air Express, Los Angeles, has engaged Eaves Construction Co., La Bala Building, to design and erect group of airplane buildings on site recently acquired at Pasadena, to cost over \$100,000 with equipment.

Ford Motor Co., Detroit, has asked bids on revised plans for branch assembling plant at Long Beach, Cal., consisting of one-story main assembly unit, 315 x 920 ft.; two-story storage and distributing plant, 80 x 104 ft.; two-story power plant, 83 x 100 ft.; one-story oil house, 61 x 114 ft., and two-story office, to cost about \$1,000,000 with equipment.

Earl W. Morrison, Lloyd Building, Seattle, Wash., architect, has plans for two-story and basement automobile service, repair and garage building, to cost \$400,000 with equipment.

Caterpillar Tractor Co., San Leandro, Cal., is considering two-story factory branch and distributing plant at Spokane, Wash., 90 x 120 ft., to cost about \$40,000 with equipment.

Holly Sugar Corporation, Colorado Springs, Colo., has awarded general contract to Dyer Construction Co., Cleveland, for addition to beet sugar mill at Tracy, Cal., to cost about \$200,000 with equipment.

Alexson Machine Co., 6160 South Boyle Avenue, Los Angeles, has awarded general contract to Union Construction Co., Slauson Avenue, Huntington Park, for one-story addition to machine shop, 60 x 200 ft., to cost about \$35,000 with equipment.

Wenatchee Beebe Fruit Co., Wenatchee, Wash., has plans for cold storage and refrigerating plant in connection with new packing house at Lewiston, Idaho, three stories, 75 x 200 ft., to cost over \$100,000 with equipment. R. C. Stockton, Perkins Building, Tacoma, Wash., is engineer.

Puget Sound Power & Light Co., Seattle, has arranged expansion and improvement program to cost about \$9,000,000, of which more than \$5,000,000 will be used for generating plants, including completion of new station near Renton, to be ready for service next fall; and extensions in generating plant at Electron, with new 7500-kw. machine. Other work will include new transmission lines and extensions in switching stations, power substations, etc.

Mason Mfg. Co., 906 East Sixtieth Street, Los Angeles, manufacturer of floor lamps, etc., has awarded general contract to Austin Co. for one-story addition, 50 x 200 ft., to cost about \$25,000 with equipment.

Kinner Airplane & Motor Corporation, Glendale, Cal., has received an order for 300 airplane motors from Alexander Industries, Colorado Springs, Colo. This order, in addition to a recent one for 300 motors from American Eagle Aircraft Co., Kansas City, Mo., has caused new Kinner factory at Glendale to speed up production to three motors per day. This schedule will be increased materially in next few weeks. W. B. Kinner is president of Kinner airplane & Motor Corporation.

Canada

TORONTO, March 4.—The machine tool market continues strong, with both sales and inquiries in larger volume.

It is reported that Ferranti Electric Co., 26 Noble Street, Toronto, is considering purchase of a 20-acre site at Weston, Ont., for erection of new plant.

Northern Electric Co., Ltd., 121 Shearer Street, Montreal, will call for bids in about 30 days for additions to its plant.

Campbell Construction Co., 484 McGill Street, Montreal, has been awarded contract for \$500,000 addition to grain elevator for Midland Simcoe Elevator Co., Ltd., Midland, Ont. C. D. Howe & Co., Whalen Building, Port Arthur, Ont., are engineers.

McColl Brothers, 114 Don Esplanade, Toronto, have started work on a \$250,000 addition to their refinery.

Canadian Scale Co., Ltd., 12 Rebecca Avenue, Toronto, has let contract to J. W. Hewitt & Sons, 58 Roncesvalles Avenue, for erection of a one-story factory, 56 x 100 ft., to cost \$20,000.

Rogers Batteryless Radio Co., 90 Chestnut Street, Toronto, has let contract to Jackson-Lewis Co., Ltd., Federal Building, for erection of a \$200,000 factory, two stories and basement, 82 x 200 ft. Horwood & White, 229 Yonge Street, Toronto, are architects.

Canadian Goodrich Co., Ltd., King Street, Kitchener, Ont., is planning to build another addition to its plant, to be four stories, 50 x 100 ft., and to cost \$100,000.

Atlas Metal Bed Mfg. Co., 3001 St. James Street, Montreal, contemplates erection of a new manufacturing plant.

W. J. Elliott Tool Co., Ltd., Woodburn Street, St. Catharines, Ont., will build addition to plant.

Tenders on bulk contract are to be called soon by Prest-O-Lite Storage Battery Co., Ltd., 805 Davenport Road, Toronto, for erection of a two-story factory, 80 x 300 ft., to cost \$125,000. Equipment and machinery will be purchased later.

Foreign

OFFICIALS of Blackburn Aeroplane Co., Leeds, England, are interested in new company to be formed in United States under name of Blackburn Aircraft Co. of America, Inc., with capitalization over \$5,000,000, to establish and operate plant in eastern section of country for production of light metal airplanes, marine aircraft and flying boats of Blackburn type. American company also proposes to operate air line to South America.

Government Railways, Wellington, New Zealand, will receive bids until May 8, for punching and shearing machines, bar cropper machine, tinsmithing tools, oil storage tanks and pumps, as per specifications on file.

Ernesto Breda Co., Sesto San Giovanni, near Milan, Italy, manufacturer of steam and electric locomotives and other electrical and mechanical equipment, including aircraft, is disposing of a bond issue of \$5,000,000 in United States, part of proceeds to be used for expansion. Guido Sagamoso is managing director.

Cubana de Electricidad, Amargura 23, Havana, Cuba, has secured Government concession for construction and operation of a number of electric generating plants

in industrial and sugar producing sections, and will start work soon. Project will include building of several transmission lines to operate at 110,000 volts, and is reported to cost over \$1,000,000. Company is controlled by American & Foreign Power Co., an interest of Electric Bond & Share Co., 2 Rector Street, New York.

British Bemberg Co., Ltd., Manchester, England, recently organized, has purchased property at Wheatley, a suburb of Doncaster, and plans early construction of rayon mill, to cost more than \$1,000,000 with machinery.

W. B. Foshay Co., Minneapolis, Minn., operating electric light and power properties, has purchased Planta Eléctrica, San Pedro Sula, Honduras, with hydroelectric generating plant and ice-manufacturing plants. New company will be formed under name of Public Utilities Consolidated Corporation to take over and develop properties. Plans are under way for enlargement in hydroelectric power plant with installation of additional equipment, and extensions in transmission lines.

Maudsley Motors, Ltd., Coventry, England, has authorized an expansion and improvement program, with several new plant units to double capacity, to cost over \$250,000.

acetylene welding and 12 numbers for electric welding, the choice depending upon conditions.

Grinding Machines.—Gardner Machine Co., Beloit, Wis. Catalog of 24 pages illustrated, showing a succession of different types of jobs being handled on grinders. Each job is discussed with regard to proper method of handling and type of machine and wheel best suited to the case.

Industrial Boilers.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Pamphlet of four pages, reprinted from *National Petroleum News*. It illustrates and describes furnaces designed particularly for oil refineries, but adapted to other industrial uses. Special attention is paid to fin furnaces.

Motor Control.—Cutler-Hammer Mfg. Co., Milwaukee. Folder of four pages illustrating motor-control devices, of which this company makes a specialty, and showing them in use in different types of industries.

Monorail System.—Louden Machinery Co., Fairfield, Iowa. Folder illustrating and describing overhead carrying system designed to cut costs of materials handling.

Air Brushes.—Paasche Air Brush Co., 1923 Diversey Parkway, Chicago. Bulletin of 16 pages devoted to different types of air brushes for industrial work. Particular attention is paid to the Lo-Hi pressure feed air brush, designed to increase the speed of painting by this means.

Electric Grinders.—Peerless Electric Co., Warren, Ohio. Folder illustrating and describing portable grinders for a variety of industrial uses. Those shown include bench equipment, pedestal mounting and mounting on overhead trolley.

Industrial Engineering.—A. A. Wickland & Co., Engineering Building, Chicago. Brochure of 32 pages, illustrated with both line cuts and halftones, showing the company's work in developing industrial plants, both single-story and multi-story. Foundries and forge shops have received great attention, many of the illustrations giving either detailed features or plans of such units.

Roller Chain.—Diamond Chain & Mfg. Co., Indianapolis. A 20-page pamphlet describing and illustrating the company's roller chain for high speed work in the lumber and wood-working industries. Special attention is devoted to the multiple strand types of roller chain.

Dry Quenching of Coke.—Dry Quenching Equipment Corporation, 200 Madison Avenue, New York. Reprint of a paper read by D. W. Wilson before the second international conference on bituminous coal. In the nine pages of the paper Mr. Wilson shows, among other things, that for a certain plant with capacity of 3300 net tons of coke daily the cost of producing steam, exclusive of fixed charges, is 2.93c. for each 1000 lb. Adding fixed charges of 8.65c. gives a total cost of 11.58c. for 1000 lb. of steam.

Steel Castings.—Silver Steel Casting Co., Milwaukee. A four-page illustrated leaflet describes some of the special castings produced by this company for incorporation in trucks and in mining machinery such as Braden winches and shoes for dredging shovels.

New Trade Publications

Powdered Fuel in Metallurgical Work.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Reprint of a paper by W. O. Renkin, which was read before the World Power Conference in London in 1928. It deals particularly with the use of powdered coal in the iron and steel industry, with some reference to its use in connection with non-ferrous metals. The pamphlet covers 31 pages.

Cobalt Steel Drills.—Morse Twist Drill & Machine Co., New Bedford, Mass. Leaflet describing briefly a type of drill put out for drilling manganese steel, and offered in competition with high-speed steel drills.

Time-Current Control.—Electric Controller & Mfg. Co., 2700 East Seventy-ninth Street, Cleveland. Folder describing a control by time and current in unison, instead of a mere time limit or current limit device. The point is made that this method of control frequently permits starting balky equipment, where the previous methods would throw out the current without getting the equipment started.

Steel Lockers.—Durabilt Steel Locker Co., Aurora, Ill. Folder 6000A, illustrating and describing many sizes and types of steel lockers for installations of almost any purpose. Both interior and exterior views of lockers are included as well as basket racks, trucks and other products made by company.

Steel Tubing.—Schutte & Koerting Co., Twelfth and Thompson Streets, Philadelphia. Brief circular providing information about Radiafin tubes for heating and cooling air and condensing vapors. Data are provided comparing Radiafin tubing with plain non-ferrous and steel tubing.

Monorail System.—Cleveland Electric Tramrail, Wickliffe, Ohio. Folder of four pages featuring the carrying of materials in suspended containers, such that the loads are kept off the floor.

Power Belt Ratings.—Charles A. Schieren Co., 38 Ferry Street, New York. Reprint of a paper by Roy C. Moore, published by *Industrial Engineering*, is one of a series on factors in belting economy. This takes up belt ratings under unusual operating conditions. Quarter-turn and crossed belts, belts running on pulleys with centers on the same vertical line and other special cases are covered in the paper.

Vortex Collector.—H. A. Brassert & Co., engineers, 310 South Michigan Avenue, Chicago. Pamphlet of four pages illustrated, describing a collector for blast furnace use placed subsequent to the regular dust collector. In one plant illustrated, the Vortex collector is said to be gathering 25 tons of dry dust each day, while the dust catcher is gathering 20 tons.

Furnace for Heat Treating.—H. O. Swoboda, 3400 Forbes Street, Pittsburgh. Pamphlet of four pages reprinted from *Fuels and Furnaces*, illustrating and describing a continuous electric furnace for heat treating strip metal and wire. The material is fed through the furnace from a reel at one end.

Welded Pressure Vessels.—A. O. Smith Corporation, Milwaukee. Bulletin 507 of 16 pages illustrates and describes a line of autoclaves and jacketed vessels produced by the company with the aid of the electric welding process. These vessels are built in a wide variety of sizes and patterns and for heavy working pressures. They can be handled in any size up to transportation limits, which may reach 400,000 lb. for special cars.

Welding Rods.—Chicago Steel & Wire Co., 103rd Street and Torrence Avenue, Chicago. Four-page folder devoted to the Weldite line of welding rods for gas and electric welding. There are four numbers specified for gas or oxy-

EDITORIAL STAFF

A. I. FINDLEY
Editor

W. W. MACON
Managing Editor

G. L. LACHER
E. E. THUM

C. E. WRIGHT
E. F. CONE

S. G. KOON
R. E. MILLER

G. S. HERRICK
G. F. TEGAN
Pittsburgh

T. H. GERKEN
F. L. PRENTISS
Cleveland

R. A. FISKE
Chicago

BURNHAM FINNEY
Cincinnati

L. W. MOFFETT
Washington

GERARD FRAZER
Boston

THE IRON AGE

ESTABLISHED 1855

Member of
Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published Every Thursday by the

IRON AGE PUBLISHING CO.

239 West Thirty-ninth Street, New York

F. J. Frank, President

G. H. Griffiths, Secretary

ADVERTISING STAFF

C. S. BAUR
General Advertising Manager

W. B. ROBINSON
Pittsburgh

F. S. WAYNE
Chicago

D. C. WARREN
Hartford

EMERSON FINDLEY
Cleveland

PERCE LEWIS
Detroit and
Cincinnati

CHARLES LUNDBERG
Philadelphia

W. C. SWEETSER
New York and
New Jersey

B. L. HERMAN
Buffalo

C. H. OBER
New York

C. LA CHAUSSEE
St. Louis

Contents for MARCH 14, 1929

Aluminum vs. Steel for Chairs 729	Scrap Institute to Adopt Business Code . . 753
Manufacture of Alloy-Metal Furniture Put on Production Basis at Buffalo	Trade Practice Conference to Lay Ground- work for Better Relations with Consumers
Measuring Open-Hearth Yields 733 ✓	Steel Ingots Make New High Record . . 755
Consideration of Various Forms of Losses and of Recovery of Scrap and Ingot Butts	February Output at Highest Daily Rate and Two-Month Production at Peak
Redesign for Production Welding 737	Colonel Lindbergh's Traveling Office . . 736
Methods Outlined Which Permit the Process to Be Used by Manufacturers	Standardization for Cultural Renaissance 739
Computing Strength of Brasses 740	Unique Device for Charging Scrap . . . 746
Curves Give Means for Predicting Effects of Alloying Elements	Soft Steel to Resist Corrosion 752
	* * *
Cleaning Forgings in Shortened Time . 742	New Equipment 747
Pickling and Tumbling in One Barrel, Fol- lowed by Soda Cleansing in Second	This Week's IRON AGE in Brief 759
Large Expansion in Electric Drive . . . 743	EDITORIALS 760
More Than 200,000 Hp. Added in 1928, Making Total 2,160,000 Hp. in 1681 Motors	Iron and Steel Markets 764
New Type of Normalizing Furnace . . . 745	Non-ferrous Metal Markets 781
Kathner Design Aims at Avoiding Loss of Heat; Long Heating and Cooling Zones	Personal Notes 784
Special Steels Feature British Exhibit . 751	Foreign Steel Markets 787
Fair Demonstrates Increasing Commercial Usefulness of Stainless, Rustless Metal	Machinery Markets 790

Owned by the United Publishers Corporation, 239 West
39th Street, New York. A. C. Pearson, Chairman. F. J.
Frank, Pres. C. A. Musselman, Vice-Pres. Fred C.
Stevens, Secy. and Treas.

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh:
811 Park Building. Boston: Room 230, 80 Federal St. Phila-
delphia: 1402 Widener Building. Cleveland: 1362 Hanna

Building. Detroit: 7338 Woodward Ave. Cincinnati: 408
Union Central Building. Buffalo: 835 Ellicott Square.
Washington: 536 Investment Building. San Francisco: 24
California Street.

Subscription Price: United States and Possessions, Mexico,
Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year.
Single Copy 25 cents.

Copyright, 1929, by Iron Age Publishing Co.

J&L
JONES & LAMSON



We Recommend
THE NEW J&L CHASER SHARPENER
FOR MAINTAINING
LIFE AND ACCURACY
OF
J & L GROUND AND LAPPED
CHASERS

JONES & LAMSON MACHINE Co.- Springfield, Vt.